GOVERNMENT OF TAMILNADU

STANDARD SIX

TERM - I

VOLUME - 3

SCIENCE
SOCIAL SCIENCE

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Department Of School Education

Untouchability is Inhuman and a Crime

Government of Tamil Nadu

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PREFACE

The Science textbook for standard six has been prepared following the guidelines given in the National Curriculum Framework 2005. The book is designed to maintain the paradigm shift from the primary General Science to branches as Physics, Chemistry, Botany and Zoology.

The book enables the reader to read the text, comprehend and perform the learning experiences with the help of teacher. The Students explore the concepts through activities and by the teacher demonstration. Thus the book is learner centric with simple activities that can be performed by the students under the supervision of teachers.

HOW TO USE THE BOOK?

- ❖ The first term VI science book has seven units.
- ❖ Two units planned for every month including computer science chapter has been introduced.
- ❖ Each unit comprises of simple activities and experiments that can be done by the teacher through demonstration if necessary student's can perform them.
- ❖ Colorful info-graphics and info-bits enhance the visual learning.
- ❖ Glossary has been introduced to learn scientific terms.
- ❖ The "Do you know?" box can be used to enrich the knowledge of general science around the world.
- ❖ ICT Corner and QR code has been introduced in each unit for the first time to enhance digital science skills.

Lets use the QR code in the text books ! How ?

- ❖ Download the QR code scanner from the Google play store/ Apple App Store into your Smart phone.
- ❖ Open the QR code scanner application
- ❖ Once the scanner button in the application is clicked, camera opens and then bring it closer to the QR code in the text book.
- ❖ Once the camera detects the QR code, a URL appears in the screen.
- ❖ Click the URL and go to the content page.

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SCIENCE (Term - I)
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Assessment

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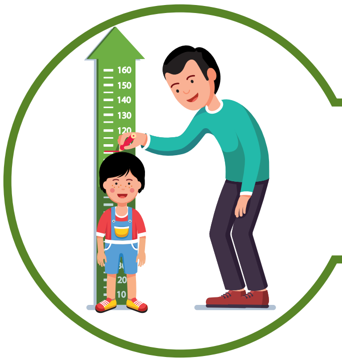
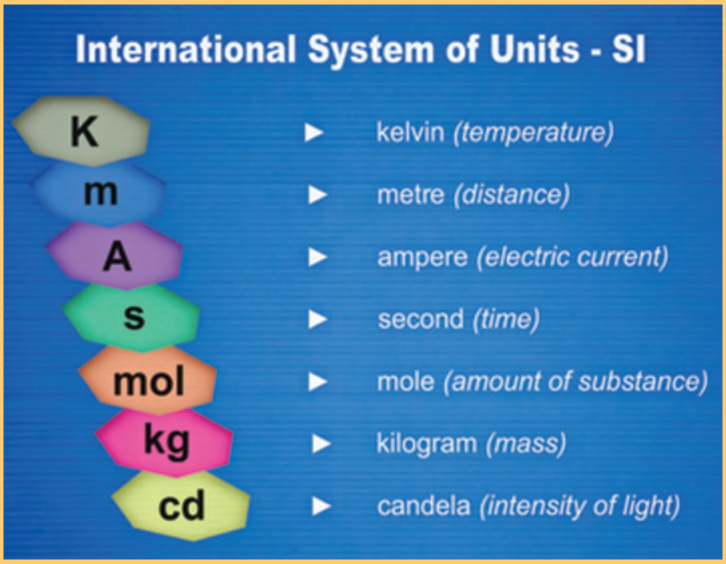
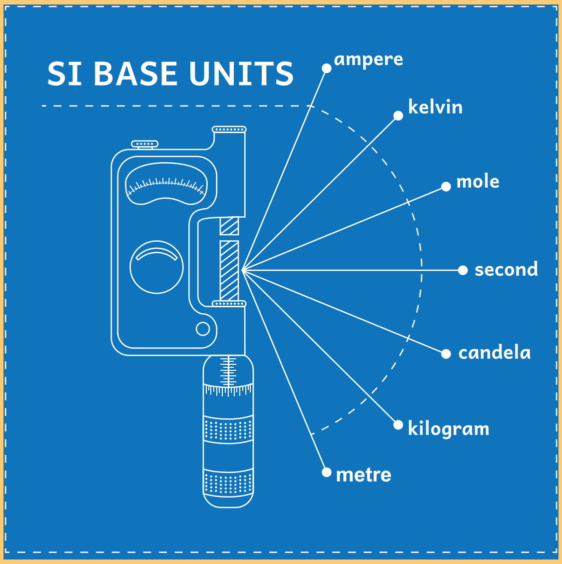


Unit 1 Measurements





Learning Objectives

- ❖ To understand the need for measurement in daily life.
- ❖ To define length, mass and time.
- ❖ To evaluate the values of some physical quantities in terms of their units and sub-units.
- ❖ To identify zero error and parallax error.
- ❖ To construct measuring tools (models).
- ❖ To solve problems based on conversion of units.

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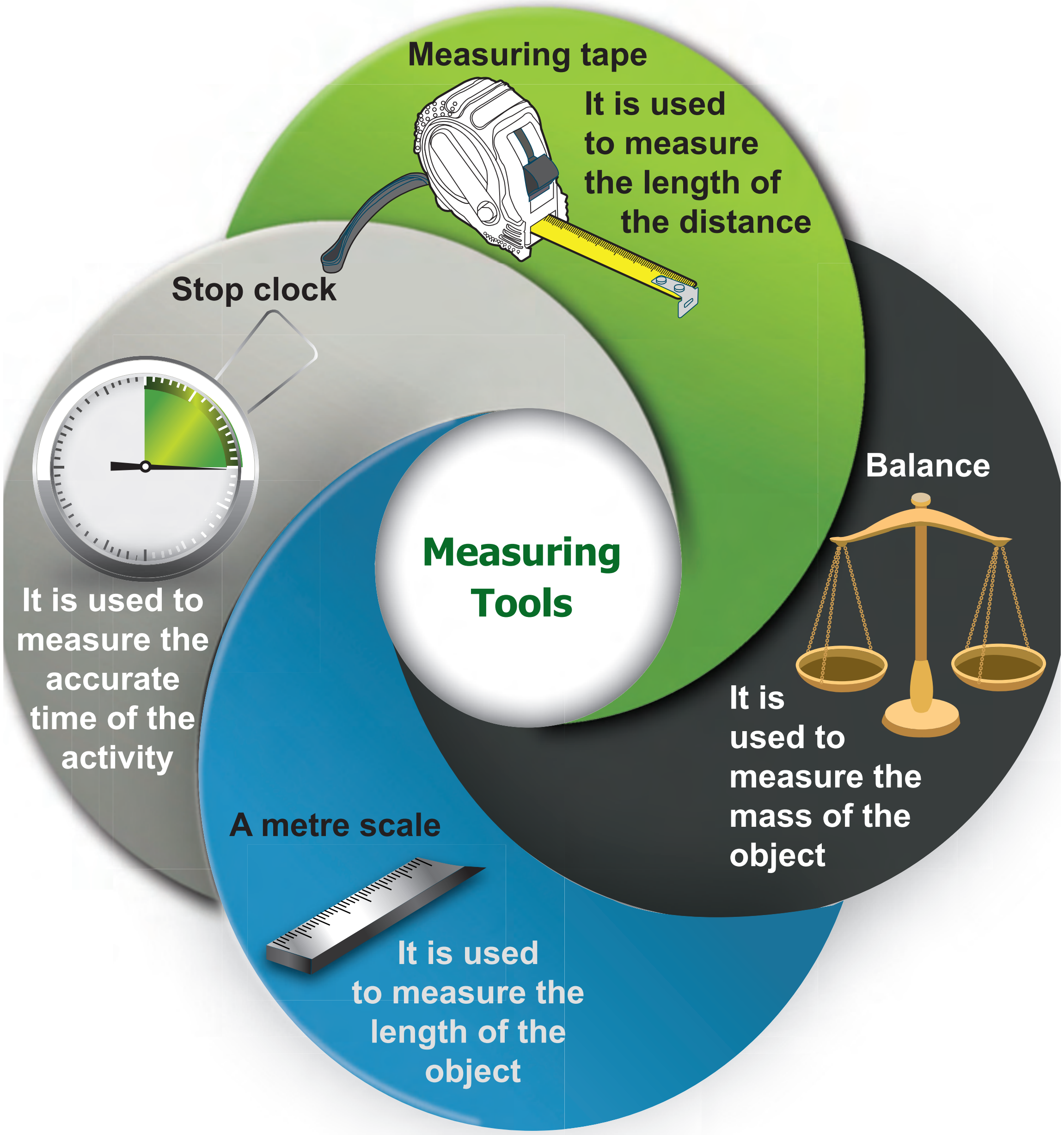
Introduction

- Your brother asks you what your height is. How will you measure it and tell him?
- Your friends decide to play kabbadi. How will you measure and draw the border lines?
- Your father gives you a bag and asks you to get potatoes. How will you ask the shopkeeper?
- Your mother gets milk from the milkman daily. How much does she get?
- How long will it take to reach your school from your house?
- How does the shopkeeper measure kerosene while selling it?

To do the tasks given above, we need to know about measurement. The comparison of unknown quantities with some known quantities is known as measurement. Measurement of a quantity has two parts: a number and a unit.

To measure the quantities we need measuring tools. What are the measuring tools that you know? Which of those tools you will use to do the tasks listed above and the similar ones?



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We hear the terms related to measurement like weight, kilogram, litres, millilitres, kilometre, length, distance etc. In this chapter let's study in detail about length, mass and time and the necessity to measure them.

1.1 Length

What is length? The distance between one point and the other desired point is known as length. It may be the distance between the edges of your book or the corners of the football ground in your school or even from your home to school.

The standard unit of length is 'metre'. It is represented by the letter 'm'. Very small lengths can be measured in millimetre (mm) and centimetre (cm). Larger measures, say height of a building, length of a banner or height of a lamp post are all measured in metre. How to express still longer lengths say, distance between two cities or villages or distance between your school and home? It is expressed in kilometre (km).

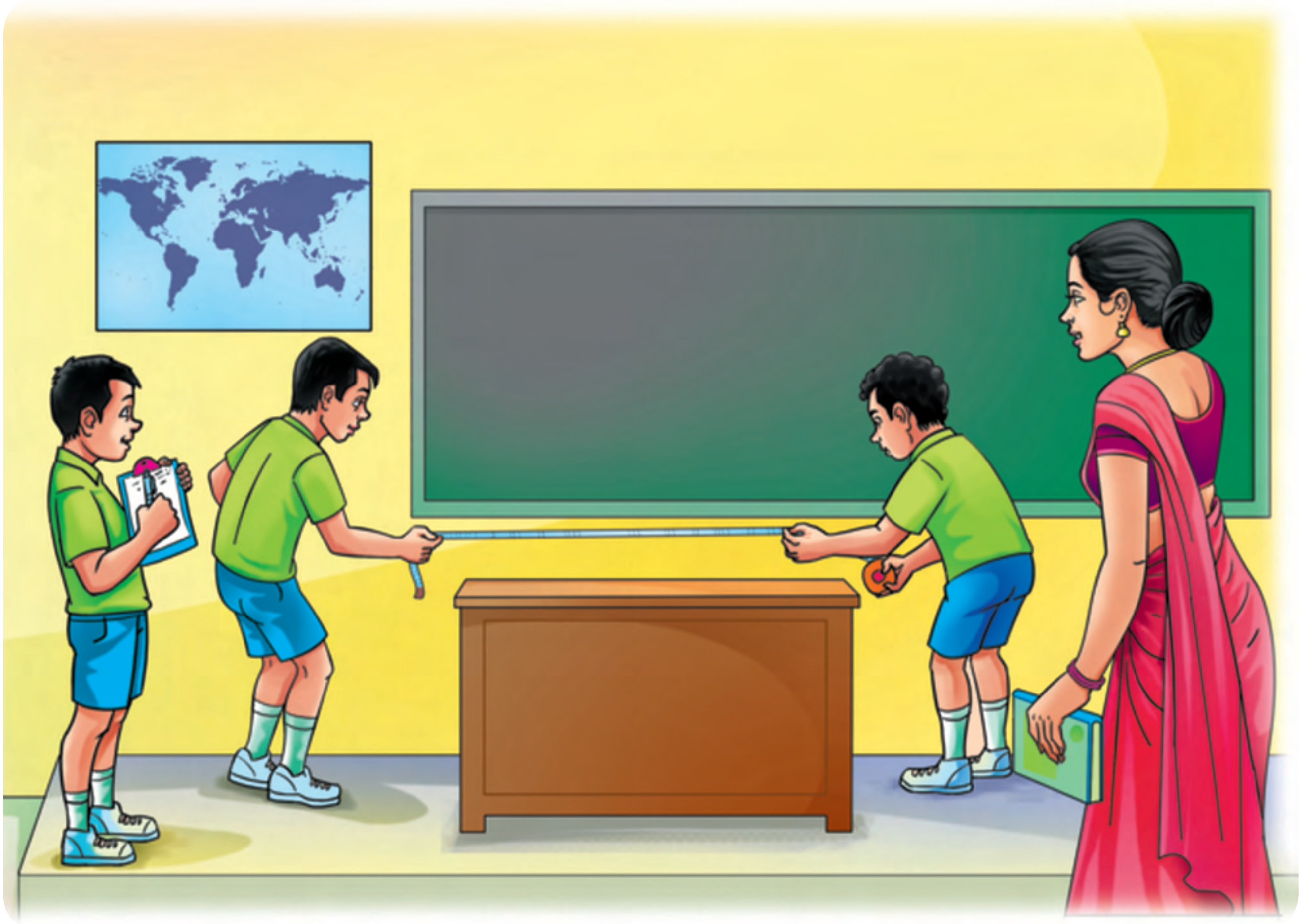
Know the unit of length

1 km (kilometre) = 1000 m (metre)
1 m (metre) = 100 cm (centimetre)
1 cm (centimetre) = 10 mm (millimetre)

Think: Can you express 1 km in cm?

Let us measure the length of your pencil.

1. Take the meter scale
2. Notice the lines with marking 1,2,3,4 ... till 15 (for smaller scales) or 30 (bigger scales). The distance between two numbers (say between 1 and 2) denotes a centimetre (written as 'cm').



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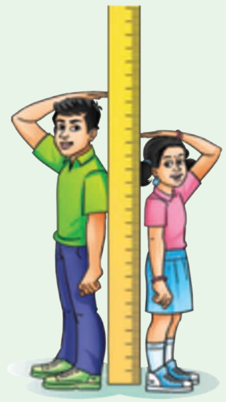
3. Notice, in between 1 and 2 there will be smaller markings. If you count, there will be 9 such lines. The distance between any two consecutive smaller markings within a 'cm' denotes a millimetre (written as 'mm').

Why do we need SI Units?

Activity 1

Form a group of 5 members. Select one person and let others measure her/his height individually using hand span and cubit. Compare your answers with others. Do you find any difference? Why? Now you all stand in front of a wall and mark your height on the wall. Measure your height with a scale. What differences do you infer?



From the activity 1, you see that your measurement is different from that of your friends. Similarly different measuring units are used in different countries.

For the sake of uniformity, scientists all over the world have adopted a common set of units to express measurements. This system is called as the International System of Units or SI Units.

- SI unit for length is metre
- SI unit for mass is kilogram
- SI unit for time is second
- SI unit for area is m^2
- SI unit for volume is m^3

Prefix

Multiples and sub-multiples of SI units are given as prefixes. Some prefixes are given in the table.

Multiples and Sub-multiples of SI Units

Prefix	Abbreviation	Submultiple/ Multiple	For Metre
Deci	d	Submultiple: 1/10	10 decimetre = 1 metre
Centi	c	Submultiple: 1/100	100 centimetre = 1 metre
Milli	m	Submultiple: 1/1000	1000 millimetre = 1 metre
Nano	n	Submultiple: 1/1000000000	1000000000 nano metre = 1 metre
Kilo	k	Multiple: 1000	1000 metre = 1 kilometre

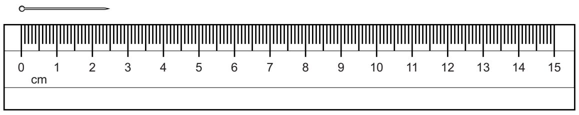
Measure the objects/event given in the table using suitable measuring units and express them with suitable multiple and submultiples.

Picture	Activity	Measuring Unit m/kg/s	Multiple / Submultiple
	Length of tip of pencil.	metre	millimetre
	Length of the pen.		
	Distance between two cities.		
	Mass of dry fruits in table.		
	Mass of ornaments.		
	Time taken to finish 100 m race.		

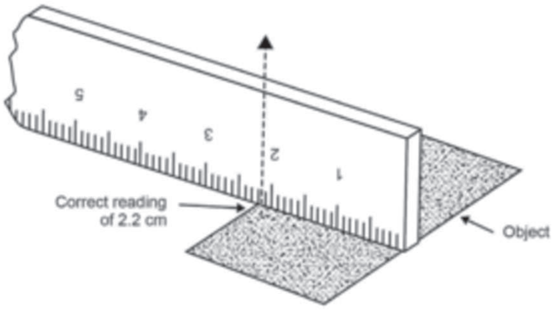
Corrective measures for Measurement

Measurement has to be accurate and the approach has to be correct always. In our day to day life approximation may not have much impact. But it has a large impact in scientific calculations. For example, if the curvature of key (lock and key) is changed even by 1 mm, the lock would not open. So, measurements have to be accurate in scientific calculations. Let us look at some common mistakes that occur while using a scale.

To measure the length of a pin



- The head of the pin has to coincide with '0' of the scale.
- Count the number of centimetre and from there count the number of finer divisions. The count of the division is in 'mm'
- In the above example the length of pin is 2 cm and 6 mm.
- Write the correct submultiple completely.



Note:

- Always keep the object parallel to the scale.
- Start the measurement from '0' of the scale.

Activity 2

Aim: To find the length of a curved line using a string.

Materials needed: A meter scale, a measuring tape, a string and a sketch pen

Method:

- Draw a curved line AB on a piece of paper
- Place a string along the curved line. Make sure that the string covers every bit of the curved line.
- Mark the points where the curved line begins and ends on the string.
- Now, stretch the string along the length of a meter scale and measure the distance between the two markings of the string and note it.
- This will give you the length of a curved line.

Find the length of a banana.

Parallax Error

Parallax is a displacement or difference in the apparent position of an object viewed along two different lines of sight.

Correct position of the eye is also important for taking measurement. Your eye must be vertically above the point where the measurement has to be

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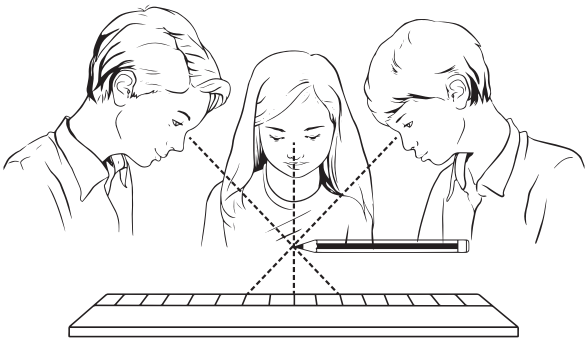
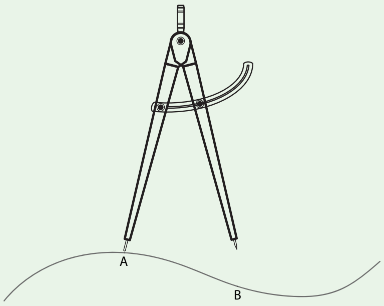


taken. In the above representation, to avoid parallax error, reading from B will be correct. From positions 'A' and 'C', the readings will be different and erroneous.

Activity 3

Aim: Measuring the length of a curved line using a divider.



Draw a curved line AB on a piece of paper.

Separate the legs of the divider by 0.5 cm or 1 cm using a ruler.

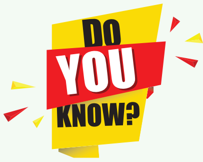
Place it on the curved line starting from one end. Mark the position of the other end. Move it along the line again and again cutting the line into number of segments of equal lengths. The remaining parts of the line can be measured using a scale. Count the number of segments.

Therefore, the length of the line = (Number of segments × Length of each segment) + Length of the left over part.

1.2 Mass

Mass is the measure of the amount of matter in an object. The SI unit of mass is kilogram. It is represented by 'kg'. Weight is the gravitational pull experienced by matter. The weight is directly proportional to the mass on the Earth's surface.

Hold a sheet of paper in one hand and a book in other hand. Which hand feels the heaviness? The mass of the book is more than that of a single sheet of paper. Therefore, the pull on the book is more than that is on the paper. Hence, our hand needs more force to hold a book than a piece of paper. The force what we experience is called as 'heaviness'.



On the moon where the gravitational force is less than that is on the earth, the weight will reduce but the mass will remain same. The moon's gravitational pull is one sixth of the earth's pull. Thus objects weigh six times lighter on the Moon than on the Earth.

What is your mass? If you measure it in grams, that would be a huge number. Is it not? So, it is expressed in kilogram. Bigger weights are measured in tonne or metric tonne.

1000 milligram	=	1 gram
1000 gram	=	1 kilogram
1000 kilogram	=	1 tonne

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Beam Balance

We use beam balance to measure mass. A beam balance works by comparing the mass of an object to that of known mass (called a standard mass).

> **Activity 4**
>
> Construct your own beam balance using two scrapped coconut shells, strings or twines, thick cardboard as frame and a little sharpened pencil as index needle.
>
> **What can you achieve?**
>
> 1. Find which object is heavier.
> 2. Find the approximate weight of lighter things like leaves, piece of papers etc.
>
>

Electronic Balance

An electronic balance is a device used to find the accurate measurements of weight. It is used very commonly in laboratories for weighing chemicals to ensure a precise measurement of those chemicals for using in various experiments. Electronic balances may also be used to weigh food, other grocery items, as well as jewellery.

1.3 Time

Day changes into night and night in to day. Seasons also change. We know time also changes. How do we measure change of time? Clocks are used to measure time. You know how to read a clock face and note the time. You can also use your pulse to measure the time roughly. Count the number of pulses. That can tell you the time elapsed.

> **Activity 5 :** Ask four or five of your friends to run a race from one end of the school to the other end. Mark the starting point and the ending point. Using your pulse (or counting by counting 1,2,3,.....) count the time taken by each of them to complete the race. Check who is fast?

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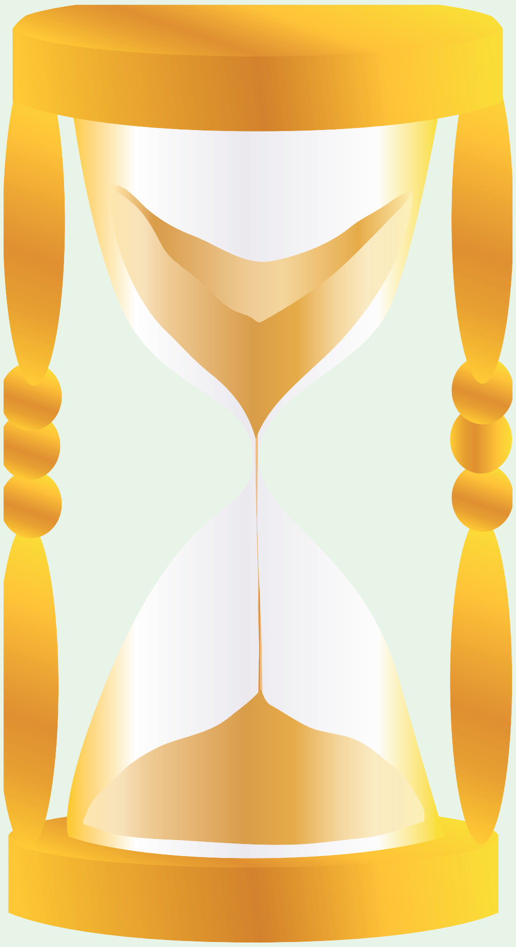
DO YOU KNOW?

In the earlier days, people used sand clock and sundial to measure the passage of time during day time. The shadow cast by a stick can be used to estimate time. A vessel having a small hole is filled with sand and it is used as a clock. The sand in the vessel is allowed to come down and it is used to estimate the time.



Sand Clock

These are rough methods for counting passage of time. We can use electronic clock, stopwatch and other instruments to count even smaller durations of time.

Fast Facts

An odometer is a device used for indicating distance travelled by an automobile.

The metric system or standard set of units was created by the French in 1790.

A ruler or scale, used now a days to measure length, was invented by William Bedwell in the 16th century.

A standard metre rod made of an alloy of platinum and iridium is placed at the Bureau of Weights and Measures in Paris. National Physical Laboratory in Delhi has a copy of this metre rod.

One kilogram is equal to the mass of a certain bar of platinum-iridium alloy that has been kept at the International Bureau of Weights and Measures in Sèvres, France since 1889.

Numerical Problems

Look at a meter scale carefully and answer the following.

- How many millimieter divisions are there in a centimeter?
- How many centimeter divisions are there in a meter?

Complete the following.

- 7875 cm = ______ m ______ cm
- 1195 m = ______ km ______ m
- 15 cm 10 mm = ______ mm
- 45 km 33 m = ______ m.

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Some open ended questions

- During your school sport day, it is planned to conduct a mini marathon race within the school campus. They decided that the running distance be 2 kilometres. Is it possible to have a school campus with the circumference of 2km? Discuss with your friends, how big the campus should be. Give other options if it is not a big campus.
- Is the distance in the sea also calculated in kilometres? How is it possible to calculate the distance in sea water? Explore!
- We know that the distance between celestial bodies is calculated in terms of light year. Light year is the distance travelled by light in one year. Now without calculator find how many kilometres light would have travelled in a year. Get the speed of light from your teacher.
- We see that the distances between Chennai and Madurai is written as 462 km. But from which point to which point is this distance calculated?. As we are science students we need to know it with the precision. Is it between the two bus stands? Or between the two railway stations? Discuss and figure it out. Check your answers with your teacher.
- A person needs to drink two litres of water a day. Note down how much water you drink each day? Make a rough calculation and check if you are drinking the required amount of water.

Points to Remember

- The comparison of an unknown quantity with some known quantity is known as measurement.
- All physical quantities have standard units for the sake of uniformity.
- Length, mass and time are some of the fundamental physical quantities.
- The SI units are:

Length	-	metre
Mass	-	kilogram
Time	-	second

- While using a ruler, the accurate measurement can be arrived by avoiding three types of possible errors.
- Electronic balance is an instrument which provides accurate measurement of mass correct upto milligram.

Evaluation

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I. Choose the correct answer.

1. The height of a tree can be measured by

   a) metre scale c) plastic ruler

   b) metre rod d) measuring tape

2. Conversion of 7 m into cm gives _____

   a) 70 cm c) 700 cm

   b) 7 cm d) 7000 cm

3. Quantity that can be measured is called ____

   a) physical quantity c) unit

   b) measurement d) motion

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4. Choose the correct one

   a) km > mm > cm > m

   b) km > mm > m > cm

   c) km > m > cm > mm

   d) km > cm > m > mm

5. While measuring the length of an object using a ruler, the position of your eye should be

   a) left side of the point.

   b) vertically above the point where the measurement is to be taken.

   c) right side of the point

   d) any where according to one's convenience.

II. Fill in the blanks.

1. SI Unit of length is _______________.
2. 500 gm = __________ kilogram.
3. The distance between Delhi and Chennai can be measured in _______.
4. 1 m = __________ cm.
5. 5 km = __________ m.

III. State True or False. If false, correct the statement.

1. We can say that mass of an object is 126 kg.
2. Length of one's chest can be measured using metre scale.
3. Ten millimetre makes one centimetre.
4. A hand span is a reliable measure of length.
5. The SI system of units is accepted everywhere in the world.

IV. Complete the analogy.

1. Sugar : Beam balance :: Lime juice :______
2. Height of a person : cm :: Length of your sharpened pencil lead :______
3. Milk : Volume :: Vegetables :______

V. Match the following.

1. Length of the fore arm	a. metre
2. SI unit of length	b. second
3. Nano	c. 10^3
4. SI Unit of time	d. 10^{-9}
5. Kilo	e. Cubit

VI. Arrange the following in the increasing order of unit.

1 Metre, 1 centimetre, 1 kilometre, and 1 millimetre.

VII. Answer in a word or two.

1. What is the full form of SI system?
2. Name any one instrument used for measuring mass.
3. Find the odd one out.

   kilogram, millimetre, centimetre, nanometre
4. What is the SI Unit of mass?
5. What are the two parts present in a measurement?

VIII. Find the answer for the following questions within the grid.

1. 10^{-3} is one ____________
2. SI Unit of time is ____________

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3. Cross view of reading a measurement leads to ____________

4. ____________ is the one what a clock reads.

5. ____________ is the amount of substance present in an object.

6. ____________ can be taken to get the final reading of the recordings of different students for a single measurement.

7. ______________ is a fundamental quantity.

8. ____________ shows the distance covered by an automobile

9. A tailor uses ____________ to take measurements to stitch the cloth.

10. Liquids are measured with this physical quantity.

IX. Answer briefly.

1. Define measurement.
2. Define mass.
3. The distance between two places is 43.65 km. Convert it into metre and cm.
4. What are the rules to be followed to make accurate measurement with scale?

X. Solve the following.

1. The distance between your school and your house is 2250 m. Express this distance in kilometre.
2. While measuring the length of a sharpened pencil, reading of the scale at one end is 2.0 cm and at the other end is 12.1 cm. What is the length of the pencil?

XI. Answer in detail.

1. Explain two methods that you can use to measure the length of a curved line.

A		P		L								R		K
C		O		E								O		S
M		K		N								R		I
P		R		G								R		T
R	H	E	S	T	E	D	L	L	I	T	R	E	D	A
L		T		H						D		H		P
O		E		O					N			K		E
A		M		S				O				R		V
V		I		E			C					T		O
E		L		K		E						S		S
R		L		I	S				T			K		H
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Z	T	D	K	H			O	D	O	M	E	T	E	R

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2. Fill in the following chart.

Property	Definition	Basic Unit	Instrument used for measuring
Length			
Mass			
Volume			
Time			

ICT CORNER

AREA & PERIMETER

Lets play with Area N Perimeter

Steps:

- Access the application by typing **Area N Perimeter** or install with the help of the link given below or the given QR code
- Open the Application and click **START** button.
- You can see the field whose area is to be measured. Drag and put the tiles on field.
- Use the (+) and (-) to find out the area of the given field.
- Click the **CHECK** button to check your answer.
- You can view your whole results by clicking the **RESULT** button.

Step1

Step2

Step3

Step4

URL:

https://play.google.com/store/apps/details?id=com.bodhaguru.AreaNPerimeter

*Pictures are indicative only

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Unit 2 Force and Motion

Learning Objectives

- ❖ To identify that push or pull or both are involved when there is a motion.
- ❖ To understand that some forces are contact forces and some are non-contact forces.
- ❖ To know that when a force is applied, it can make things move, change the direction or change its shape and size.
- ❖ To distinguish between rest and motion and understand that they are relative.
- ❖ To infer motion is caused by application of force.
- ❖ To classify different types of motion.
- ❖ To deduce the definition of speed.
- ❖ To understand and use the unit of speed.
- ❖ To distinguish uniform and non-uniform motion.
- ❖ To compute time, distance and speed.

Introduction

We have studied in our earlier classes that push or pull results in some motion of the object. When we open the door or kick a football or lift our school bag, motion is involved and there is some push or pull.

2.1 Motion and Rest

What is rest? What is motion?

Suppose there is a book on your table right in the middle. Is the book moving? You will say it is not moving; it is at rest. If you push the book to one side of the table to clear the space for keeping your notebook, then you will say the book is moving. When the book was at the same place with respect to the table, it was at rest; but when it was pushed from one place on the table to another place, it was moving.

Activity 1

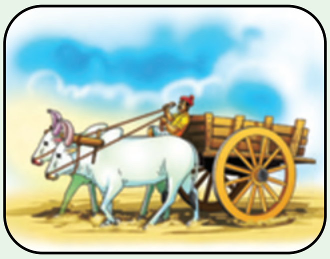
Can you identify whether it is push or pull that results in motion in the following cases?

Push / Pull

Push / Pull

Push / Pull

Push / Pull



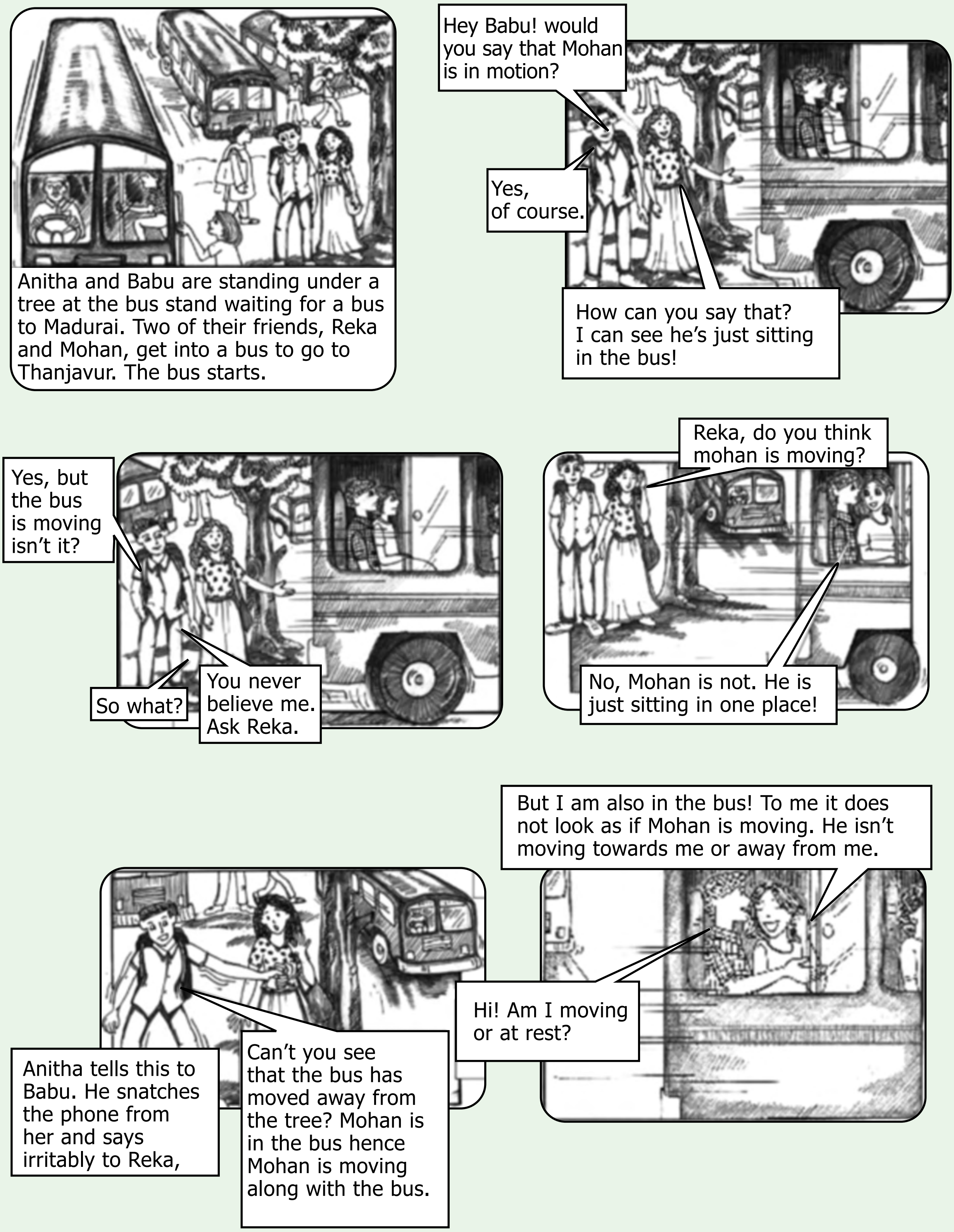
Push / Pull

Push / Pull

When there is a change in the position of an object with respect to time, then it is called motion. If it remains stationary it is called rest.

Is Mohan in motion?

Observe the following pictures and say whether Mohan is in motion or at rest



Discuss: Who is correct? Is Mohan really in motion?

We can clearly say that both Reka and Babu are correct. From the point of view of Babu, Mohan along with the bus is in motion; but for Reka who is sitting beside him, he is at one place; therefore stationary. So, according to Babu, Mohan is in motion; Mohan is at rest from Reka's observation. Can you think any other examples?

Answer by observing the situation in the picture

Event 1: The man in the boat is moving with respect to the bank of river. He is at rest with respect to the boat.

Event 2:

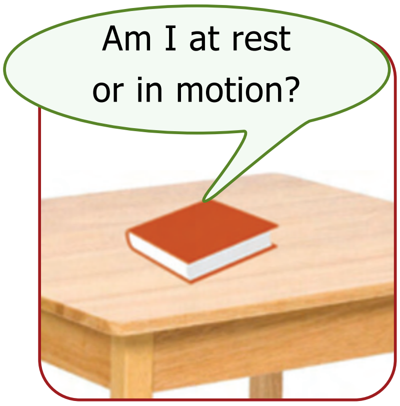
The girl on the swing is ______________ with respect to the seat of the swing.

She is ________ with respect to the garden.

Event 3: Nisha is going to her grandmother's house by bicycle. Sitting on the bicycle, Nisha is ______________ with respect to the road.

She is ______________ with respect to the bicycle.

Take the case of a book on a table at rest. Is it really without any motion? We know that Earth is rotating on its axis; therefore the table along with the book must be rotating. Is it not? We are also moving along with the earth. Therefore, from the point of view of the ground on which we stand, the book is at 'rest'. Similarly, while travelling in a bus, we feel that the poles and trees seem to move backwards, and the things inside the bus are stationary.



An object may appear to be stationary for one observer and appear to be moving for another. An object is at rest in relation to a certain set of objects and moving in relation to another set of objects. **This implies that rest and motion are relative.**

Activity 2

Moon or Cloud?

Observe the moon on a windy night with a fair bit of cloud cover in the sky. As the cloud passes in front of the moon you sometimes think it is the moon which is moving behind the cloud. What would you think if you were to observe a tree at the same time?

How things move?

When we kick a ball it moves. When we push the book on the table, it moves. When a bullock pulls, the cart moves. Motion occurs when an object is pulled or pushed by an agency.

In our daily life, we pull out water from the well using bucket. Animals pull a bullock cart. It is a person or animal, that is an animate agency that does the pushing or pulling.

Sometimes we see a tall grass in the meadow dancing in the wind or a piece of wood moving down a stream. What pushes or pulls them? We know that blowing wind and flowing water is the cause. Sometimes the push or pull can be due to the inanimate agency.

Forces are push or pull by an animate or inanimate agency.

Contact, Non-contact Forces

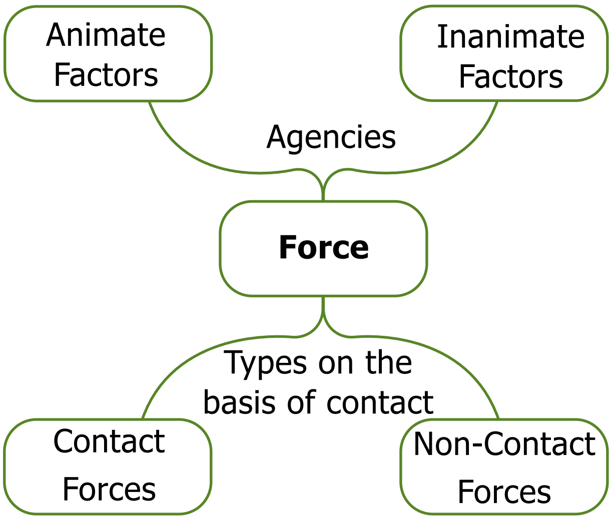
Forces can be classified into two major types; contact and non-contact forces.

Wind making a flag flutter, a bullock pulling a cart are contact forces. Magnetism, gravity are some examples of non-contact forces.

In all the above cases, the force is executed by touching the body. So, this type of forces are called contact forces.

Mysteriously, ripen coconut falls to the ground. What pulls it to the ground? We would have heard about 'force of gravity' of Earth. Gravity pulls the ripen coconut from the tree to the ground.

When we bring a magnet near a small iron nail, the nail jumps into the air and sticks with the magnet. Observe that the magnet and the nail did not touch each other. Still, there was a pulling force that made the nail to jump towards the magnet. In these two examples, the force is applied without touching the object. Such forces are known as non-contact forces.

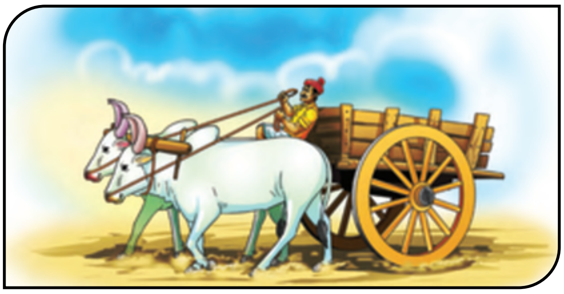


What happens when we apply a force on an object?

What happens when you apply a force on an object? Say, you push a book on the table. The book moves. Application of force in an object results in motion from a state of rest.

What happens when a batsman hit a ball? The ball is already in motion, but with the strike, the speed of the ball increases. Moreover the direction of the ball changes. Application of force on an object results in a change in its speed and change in its direction.

When we crush a balloon or press roti dough or pull a rubber band, the shape of the object changes on application of force. Application of force in object results in expansion or contraction.



Look at this picture. The person is applying force to stop the cart from moving. When the force is applied against the direction of the motion, the speed can be reduced, or even the motion is stopped completely. Discuss what happens when you apply break in a speeding bicycle.

In a nutshell, we can say that the applied force is an interaction of one object on another that causes the second object to move from rest, speed up, slow down, stop the motion, change the direction, compress or expand.

Forces can

1. Change the states of a body from rest to motion or motion to rest.
2. Either change the speed or direction or both of the body.
3. Change the shape of the body.

Activity 3

Fill in the empty spaces

Force can

- move objects at rest
- ______
- change the speed
- ______
- ______
- compress or expand

Can you give example for contact and non-contact forces?

Force

Contact Force	Non-Contact Force
Examples	Examples
Kick a football	Magnet attracts nails
______	______

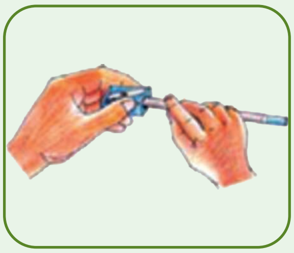
2.2. Types of motion

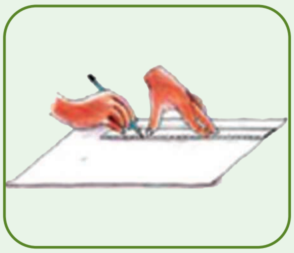
Activity 4

Play with pencil

Do what Shanthi did...

(i) Shanthi took a pencil and sharpened it with a sharpener. (ii) Then she drew a circle using the pencil and a compass. (iii) Later she took her ruler (scale) and drew a straight line in another paper. (iv) Then she kept the pencil between her fingers and moved it back and forth.





Now, look at the motion of the pencil in all these four cases. How was it?

(i) In the first case, the pencil **rotated in its axis.**

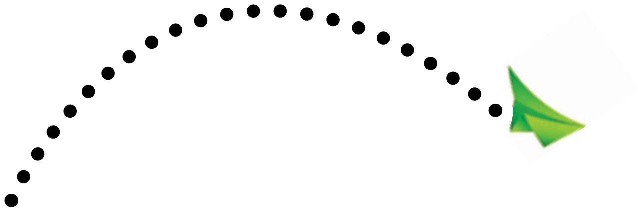
(ii) In the second case, it went in **a circle.**

(iii) In the third case, the pencil travelled in **a straight line.**

(iv) In the fourth case, the pencil tip moved **back and forth,** that is it oscillated like a swing.

We can say that the motion of the pencil was rotational, circular, straight line or linear and later oscillatory.

Throw paper aeroplanes or paper dart. Watch its flight path when you throw it at an angle. The path curves i.e the paper flight is moving ahead but its direction is changing while moving. Such paths are called curvilinear.



A fly buzzing around the room is a combination of all these motions and flight path is zigzag.

You can classify the motion according to the path taken by the object.

a. Linear motion - Motion in a straight line. Eg. A person walking on a straight path.

b. Curvilinear motion - Motion of a body moving ahead but changing direction. Eg. Motion of a ball thrown.

c. Circular motion - Motion in a circle. Eg. Swirling stone tied to the rope.

d. Rotatory motion - Motion of a body about its own axis. Eg. Rotating top.

e. Oscillatory motion - A body coming back to the same position after a fixed time interval. Eg. A pendulum.

f. Zigzag (irregular) - The motion of a body in different direction. Eg. People walking in a crowded street.

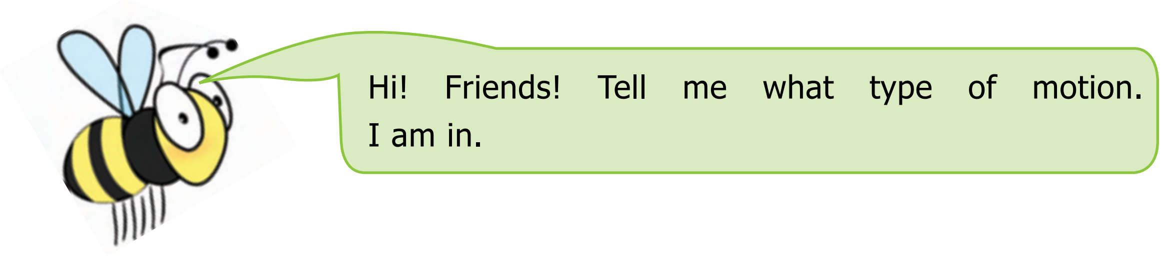
DO YOU KNOW?

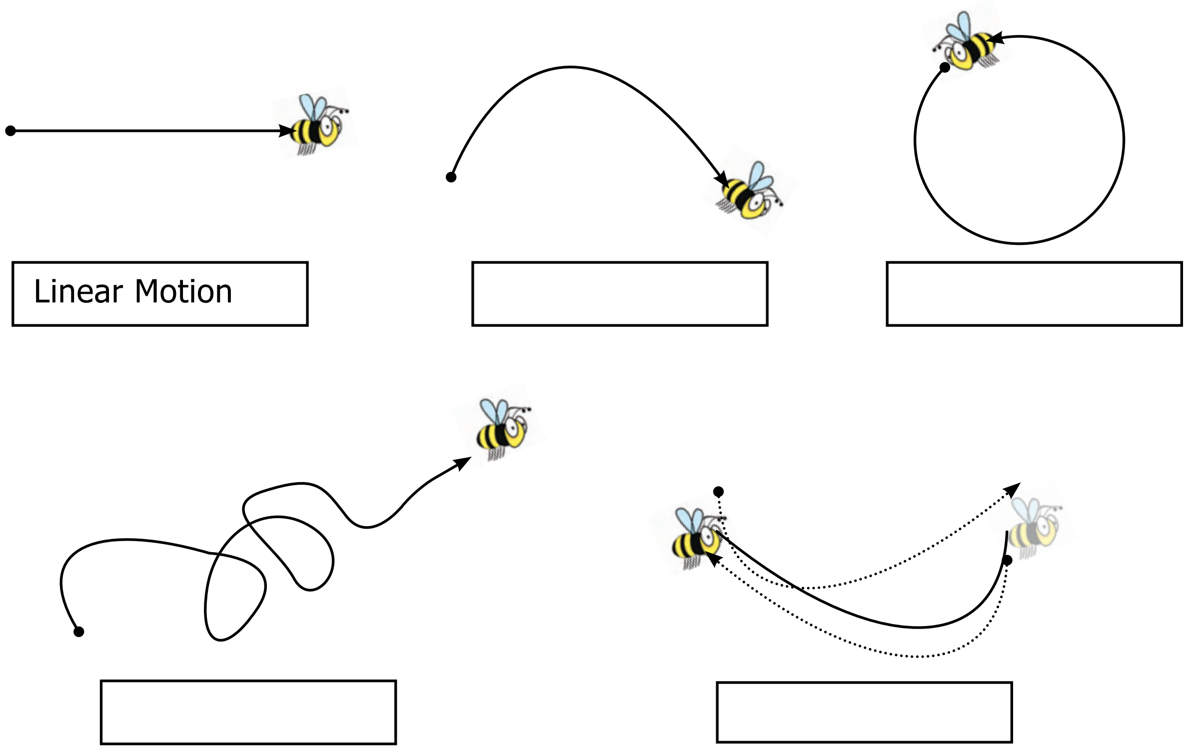
Oscillations at Greater Speed

Ask your friend to hold the two ends of a stretched rubber band. Strike it in the middle. Do you see that it oscillates very fast? When the oscillation is very swift, it is called as vibration.

Fast oscillations are referred to as vibrations.

Activity 5





Activity 6

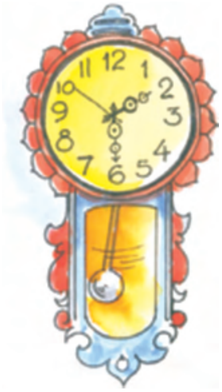
Classify the following according to the path it takes.

Linear, Curvilinear, Circular, Rotatory, Oscillatory, Zigzag (irregular)

• A sprinter running a 100 m race	
• A coconut falling from a tree	
• Striking a coin in a carom board game	
• Motion of flies and mosquitoes	
• Beating of heart	
• Children playing in a swing	
• The tip of hands of a clock	
• Flapping of elephant's ears	
• A stone thrown into the air at an angle	
• Movement of people in a bazaar	
• Athlete running around a track	
• Revolution of the moon around the earth	
• The movement of a ball kicked in a football match	
• Motion of a spinning top	
• Revolution of the earth around the sun	
• Swinging of a pendulum	
• Children skidding on a sliding board	
• Skidding down a playground slide	
• Wagging tail of a dog	
• Flapping of a flag in wind	
• A car driving around a curve	
• Woodcutter cutting with a saw	
• Motion of water wave	
• Motion of piston inside a syringe	
• Bouncing ball	
[Add five motions you observe to this list]	

Periodic and non-periodic motions

Take the case of the hour-hand of a clock. In one day it makes two rounds. Look at a bouncing ball. It bounces a certain number of times for a given time interval or period. Look at the water waves. In a given period that is in a time interval, a fixed number of waves hit the shore. Motion repeated in equal intervals of time is called as periodic motion.



Let us take the example of sapling swing in wind. This motion is not in uniform interval. Such motions are called non-periodic motion.

Revolution of the Moon around the Earth is periodic but not oscillatory. However, the children playing in a swing is both periodic and oscillatory.

DO YOU KNOW? All oscillatory motions are periodic, but not all periodic motion are oscillatory motion.

Fast Vs Slow?

Look at a tall tree. When the wind is gentle, its branches are dancing slowly; but if the gentle wind becomes strong, the branches shake violently, and if the speed increases further, the branch may even break and fall. That is the motion can be slow or fast. Can we say a motion is slow or fast without comparing anything?

Compared to walking, cycling is fast, but a bus is faster than a cycle. The aeroplane is much faster than a bus. So, slow or fast is a relative concept which depends upon the motions we are comparing. Then how do we say a body moves at a particular speed?

Speed.

Taxi Driver: I have travelled 160 km in two hours.

Bus Driver: I have travelled 200 km in four hours.

Truck Driver: I have travelled 300 km in five hours.

Can you say who travelled with highest speed?

Let us calculate how long they travelled in one hour?

- Distance travelled by the car in one hour = ___80___ km (160/2)
- Distance travelled by the bus in one hour = __________ km
- Distance travelled by the truck in one hour = __________ km

Have you found out? Say now.

Who is fast? __________,

Who is slow? __________

Have you noticed that saying who is fast or slow is easy when we calculate the distance they travelled in one hour? In other words, you divide the distance travelled by the time taken to get the speed.

> The distance travelled by an object in unit time is called speed of the object.
>
> If an object travelled a distance 'd' in time 't' then, its speed is given as:
>
> $$\text{Speed (s)} = \frac{\text{Distance travelled}}{\text{Time taken}} = \frac{d}{t}$$

Suppose a car travels 300 km in one hour. Then we say that the speed of the car is '300 kmph' (We read it as 'three hundred kilometres per hour').

If an object travelled 10 metre in 2 second, then its speed is given as:

Speed (s) = Distance travelled (d) / Time taken (t)

= 10 metre/ 2 second

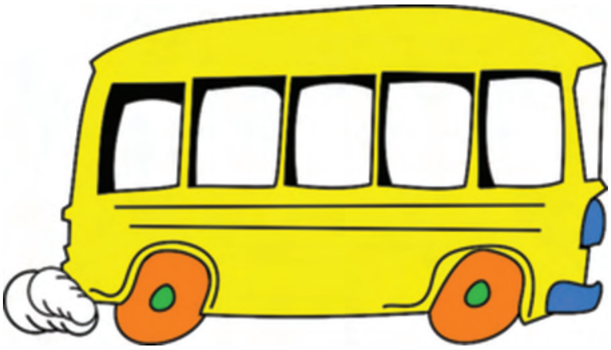
= 5 metre / second

A bus takes three hours to cover a distance of 180 kilometres. Then its speed is given as:

Speed (s) = Distance travelled (d) / Time taken (t)

= 180 kilometre/ 3 hour

= 60 kilometre / hour



Note that metre/second or kilometre/hour comes next to our answer for speed. What is it?

Observe the formula for speed. If we denote the distance in metre and time by second then the unit of speed is metre/second. If we denote the distance in kilometre and time in hour then the unit of speed is kilometre/hour. Sometimes we use units like centimetre/second.

In science we generally use SI units. In SI units the unit of distance is metre and the unit of time is second. So, the SI unit of speed is metre/second.

Let us calculate

1. A car travelled 150 metre in 10 second. What is its speed?
2. Priya rides her bicycle 40 km in two hours. What is her speed?

Our speed...

Let us play a small game. Go to the playground with your friends. Mark 100 metre distance for a race. Conduct a friendly running race and calculate the time taken by them to complete the distance. Now record the time in the table.

S. No	Name of the Student	Distance	Time taken (in seconds)	Speed $= \frac{\text{Distance travelled}}{\text{Time taken}}$	Speed (m/s)
1	Murugesan	100 m	12 S	100 M / 12 S	8.3 m/s
2		100 m			
3		100 m			
4		100 m			
5		100 m			

If you know the speed of an object and the time taken by it, then we can compute how much distance it had travelled.

We know that,

$$\text{Speed} = \frac{\text{Distance travelled}}{\text{Time taken}}$$

$$s = \frac{d}{t} \text{ or } st = d$$

Therefore, the distance travelled (d) = speed (s) × time (t).

$$d = s \times t$$

Usain Bolt crossed 100 metre in 9.58 seconds and made a world record. If you are able to run faster than him, then Olympic Gold Medal is waiting for you.

If a ship travelled at a speed of 50 kmph and it sailed for five hours, how much distance it has travelled?

Distance = $s \times t$

$= 50 \text{ kmph} \times 5 \text{ h} = 250 \text{ km}$

If we know the speed and distance travelled we can compute the time taken.

$$s = \frac{d}{t} \quad \text{or} \quad t = \frac{d}{s}$$

Time taken = Distance travelled / Speed

Suppose a bus travels at a speed of 50 kmph and has to cover a distance of 300 km, how much time will it take?

$$t = \frac{d}{s} = 300 \text{ km}/50 \text{ kmph} = 6 \text{ h.}$$

Compute the following Numerical Problems.

1. If you travel 10 kilometres in 2 hours, your speed is ______ km per hour.
2. If you travel 15 kilometres in 1/2 hour, you would travel ______ km in one hour, and your speed is ______ km per hour.
3. If you run fast at 20 kilometres per hour for 2 hours, you will cover ______ km

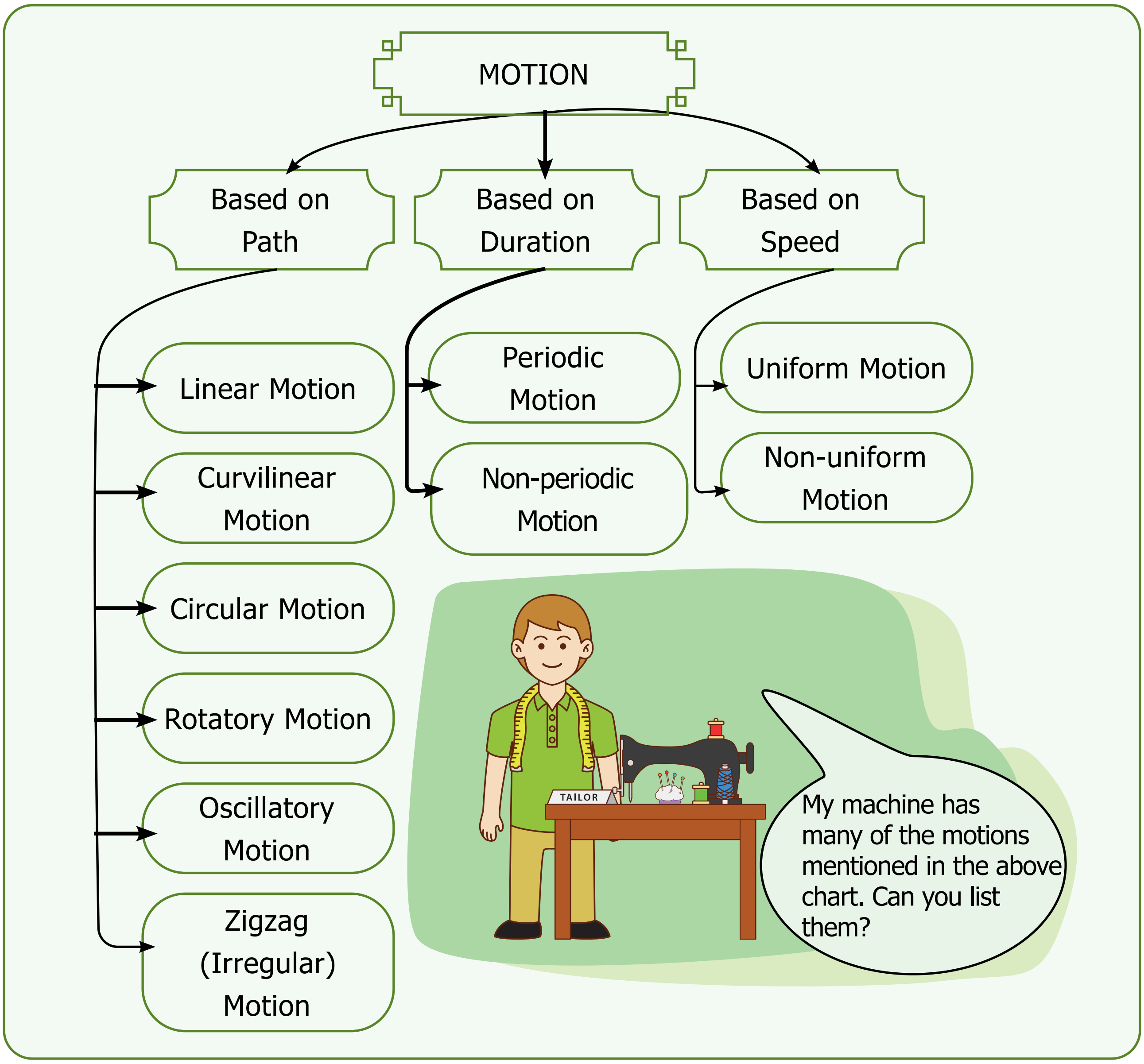
FACT FILE

A Cheetah is the fastest land animal running at a speed of 112 km/h.

Uniform and Non-uniform motion

Suppose a train leaves Thiruchirapalli and arrives at Madurai. Will the train travel in an uniform speed? First, the train will be stationary. When the train leaves the station, the motion will be slow. After it moved some distance it will gather speed. After that it may slow down while crossing bridges and stop at intermediate stations for passengers. Finally, as the train approaches Madurai, again it will slow and finally will come to a halt. It means that the speed is not the same all through the journey. That is, the speed is non-uniform. This motion is said to be non-uniform motion.

However, in between the journey, there may be a stretch where in the train might go at a constant speed. During that interval the train will be moving at uniform speed. That is, its motion is uniform.



Many motions we see in our day to day life are non-uniform. We will learn more about uniform and non-uniform motion in higher classes.

If an object covers uniform distances in uniform intervals then the motion of the object is called uniform motion. Otherwise the motion is called non-uniform motion.

In a nutshell, we can classify the motion in terms of a) path b) if it is periodic or not c) if the speed is uniform or not. However, in real life, the motions are combinations of many types of motion.

Multiple Motion

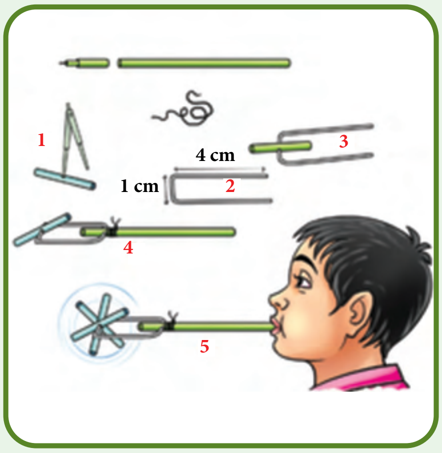
Look at the bicycle in the picture. What type of motion does the wheel perform? What type of motion does the cycle in total perform?

The tyres rotate and make a rotatory motion, but the cycle as such moves forward in a linear path.

Activity 7

Simple Spinner

Let us enjoy by making a simple spinner. Make it by the following instruction.



Cut a 2cm long piece from an old ball-pen refill and make a hole in its center with a divider point (Fig. 1).

Take a thin wire of length 9cm and fold it into a U-shape (Fig. 2).

Weave the refill spinner in the U-shaped wire (Fig. 3).

Wrap the two ends of the wire on the plastic refill, leaving enough clearance for the spinner to rotate (Fig. 4).

On blowing through the refill, the spinner rotates (Fig. 5).

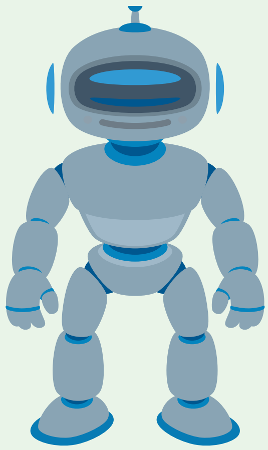
For obtaining maximum speed adjust the wires so that air is directed towards the ends of the spinner.

Have you enjoyed with simple spinner? Do you observe the motions in the toy? Can you answer the following questions?

1. Motion of the air in tube is ______________ motion.
2. Motion of the refill stick is ______________ motion.
3. The toy converts ______________ motion into ______________ motion.

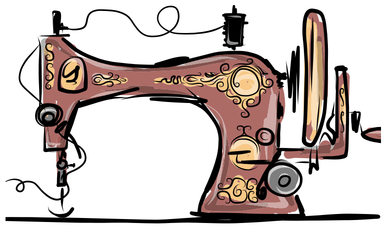
Think

In a simple spinner linear motion is converted into rotatory motion. Can you make a toy which converts rotatory motion into linear motion?



A bipedal humanoid robot.

Multiple motion in a sewing machine



- Motion of the needle

  ____
- Motion of the wheel

  ____
- Motion of footrest

  ____

2.3 Science Today - Robot

Robots are automatic machines. Some robots can perform mechanical and repetitive jobs faster and more accurately than people. Robots can also handle dangerous materials and explore distant planets.

The term 'robot' comes from a czech word, 'robota' meaning 'forced labour'. Robotics is the science and study of robots.

What can Robots do?

Robots can sense and respond to their surroundings. They can handle delicate objects or apply great force. For example, they can perform eye operations guided by a human surgeon, or assemble a car. With **artificial intelligence**, robots will also be able to make decisions for themselves.

How do Robots sense?

Electronic sensors function as robot's eyes and ears. Twin video cameras give the robot a 3-D view of the world. Microphones detect sounds. Pressure

The quadrupedal military robot

sensors give the robot a sense of touch, to judge how to grip an egg or heavy luggage. Built-in computers send and receive information with radio waves.

Artificial Intelligence

Artificial intelligence attempts to create computer programs that think like human brains. Current research has not achieved this, but some computers can be programmed to recognize faces in a crowd.

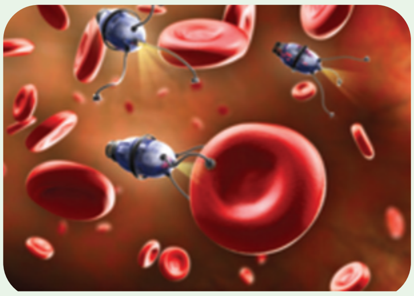
Can Robots think?

Robots can think. They can play complex games, such as chess, better than human beings. But will a robot ever know that it is thinking? Humans are conscious - we know we are thinking. But we do not know how consciousness works. We do not know if Robots can ever be conscious.

Articulated welding robots (industrial)

Nanorobotics

Nanobots are robots scaled down to microscopic size in order to put them into very small spaces to perform a function. Future nanobots could be placed in the blood stream to perform surgical procedures that are too delicate or too difficult for standard surgery. Imagine if a nanobot could target cancer cells and destroy them without touching healthy cells nearby.



Future of Nanorobotics

Points to Remember

- Motion and rest are relative.
- All things that are at rest may seem to be in motion from a different point of view, and all motion may seem to be at rest from a different perspective.
- Application of forces is implemented by a push or pull. Forces can be applied by animate as well as inanimate agency.
- Application of forces result in motion of an object at rest, increase or decrease its speed, change its direction, and distortion of the shape.
- Some forces act only when they are in contact. There are some forces which can even have effect at a distance.
- Speed = Distance travelled / Time taken ($s = d/t$)
- The motion can be classified according to the path (periodic or non-periodic) or according to speed (uniform or non-uniform).
- Unit of speed is m/s.

Evaluation

I. Choose the correct answer.

1. Unit of speed is

   a. m b. s c. kg d. m/s

2. Which among the following is an oscillatory motion?

   a. Rotation of the earth about its axis.

   b. Revolution of the moon about the earth.

   c. To and fro movement of a vibrating string.

   d. All of these.

3. The correct relation among the following is

   a. Speed = Distance × Time

   b. Speed = Distance / Time

   c. Speed = Time / Distance

   d. Speed = 1 / (Distance × Time)

4. Gita travels with her father in a bike to her uncle's house which is 40 km away from her home. She takes 40 minutes to reach there.

   Statement 1 : She travels at a speed of 1 km / minute.

   Statement 2 : She travels at a speed of 1 km/hour.

   a. Statement 1 alone is correct.

   b. Statement 2 alone is correct.

   c. Both statements are correct.

   d. Neither statement 1 nor statement 2 is correct.

II. Fill in the blanks.

1. A bike moving on a straight road is an example for ______________ motion.
2. Gravitational force is a ______ force.
3. Motion of a potter's wheel is an example for __________ motion.
4. When an object covers equal distances in equal interval of time, it is said to be in ______ motion.

III. State True or False. If false, correct the statement.

1. To and fro motion is called oscillatory motion.
2. Vibratory motion and rotatory motion are periodic motions.
3. Vehicles moving with varying speeds are said to be in uniform motion.
4. Robots will replace human in future.

IV. Match the following.

1. a. Circular motion

2. b. Oscillatory motion

3. c. Linear motion

4. d. Rotatory motion

5. e. Linear and rotatory motion

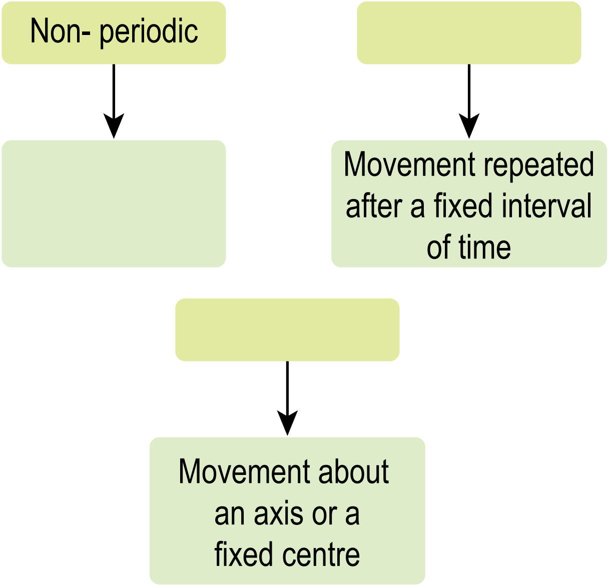
V. Given below is the distance-travelled by an elephant across a forest with uniform speed. Complete the data of the table given below with the idea of uniform speed.

Distance (m)	0	4		12		20
Time (s)	0	2	4		8	10

VI. Complete the analogy.

1. Kicking a ball : Contact force :: Falling of leaf : _______?
2. Distance : metre :: Speed : ______ ?
3. Circulatory motion : A spinning top :: Oscillatory motion : ___________?

VII. Complete the web chart.



VIII. Answer in a word or two.

1. The force which acts on an object without physical contact. ___________
2. A change in the position of an object with time. ___________________________
3. The motion which repeats itself after a fixed interval of time. _______________
4. The motion of an object which covers equal distances in equal intervals of time. ______________________________
5. A machine capable of carrying out a complex series of actions automatically. ______________________

IX. Answer briefly.

1. Define force.
2. Name different types of motion based on the path.
3. If you are sitting in a moving car, will you be at rest or motion with respect your friend sitting next to you?
4. Rotation of the earth is a periodic motion. Justify.
5. Differentiate between rotational and curvilinear motion

X. Answer in detail.

1. What is motion? Classify different types of motion with examples.

XI. Problems.

1. A vehicle covers a distance of 400km in 5 hour. Calculate its speed.

XII. Give examples.

Linear motion	
Curvilinear motion	
Self rotatory motion	Motion of the wheel in a cart
Circular motion	
Oscillatory motion	
Irregular motion	

ICT CORNER

Force and motion

Play with force and motion.

Steps:

- Lets learn force and motion on **PhET** in Google browser. Download and install.
- Drag any one side and place him in the knot portion of the rope. Now click **go**.
- If placed on the right side then the load will move in that direction. The place of the man and the number of man can be changed. The direction of force and the unit of force will display on the screen.
- If we place equal number of men on both the sides the load will not move.
- By changing the number of men the strength of force can be changed.

Step1

Step2

Step3

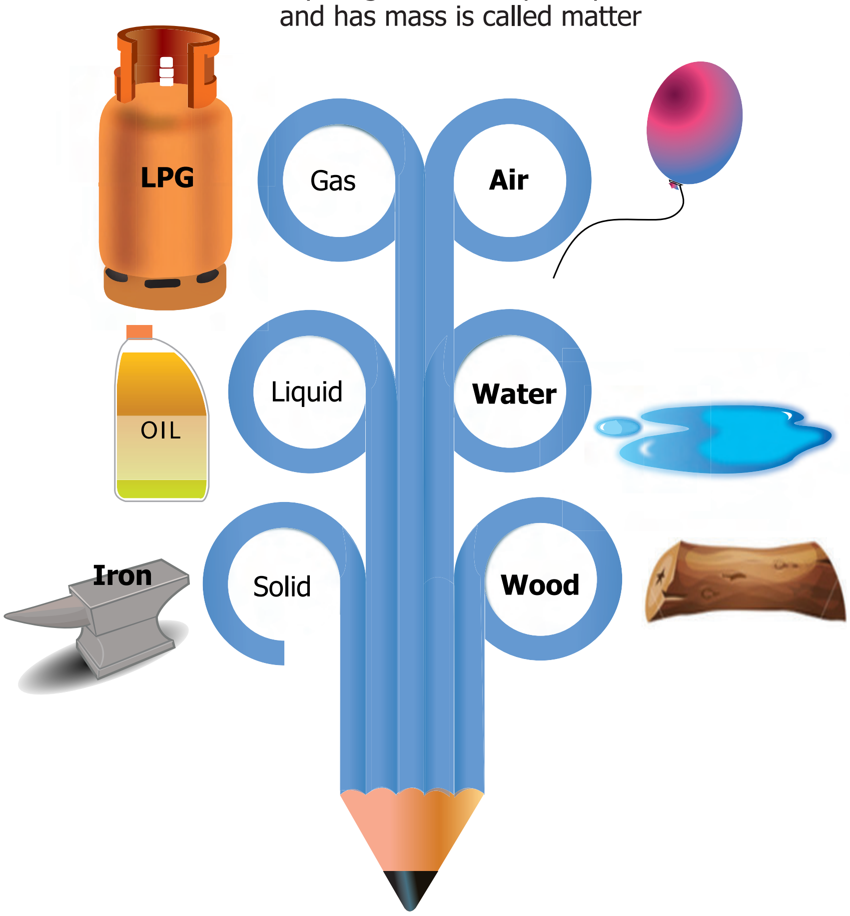
URL:

https://phet.colorado.edu/en/simulation/forces-and-motion-basics

*Pictures are indicative only

Unit 3 Matter Around Us

Anything which occupies space and has mass is called matter



Learning Objectives

- ❖ To define matter and develop an understanding on the particle nature of matter.
- ❖ To sort the objects on the basis of certain properties.
- ❖ To differentiate solids, liquids and gases based on the arrangement of their particles.
- ❖ To differentiate pure substances from mixtures.
- ❖ To identify the need for separation of mixtures.
- ❖ To suggest suitable methods for separating given samples of mixtures.
- ❖ To acquire an awareness on food adulteration and its harmful effects.

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Introduction

Matter is everywhere around us. The air we breath, water we drink and the material we use are made up of matter. Matter is defined as anything that occupies space and has mass. Matter is found in three major states: solid, liquid and gas. Do you know what is matter made of?

Matter is made of atoms. Atoms are the smallest particle of matter. They are so small that you cannot see them with your eyes or even with a standard microscope. A standard sheet of paper is about millions of atoms thick. Science has come up with a technology to identify the structure of atoms by using Atomic resolution Microscope (ARM) and Tunnelling Electron Microscope (TEM) which use electricity to map atoms. There is more about atoms in the later classes. But first let's learn about the three states of matter.

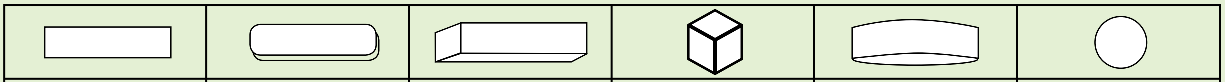
3.1 Physical Nature of Matter

Matter occupies space and has mass. What is its nature? Many philosophers pondered over this question and came out with ideas.

Imagine that a piece of thread is cut endlessly using knife. At one point it would be like a small piece that it cannot be further cut by a knife. That small particle may contain millions of molecules and these molecules are made of atoms. Matter is made of such smallest particles 'atoms'. These atoms are extremely small even to see under a powerful microscope.

Activity - 1

Take a few crystals of sugar. Observe them carefully with the help of a magnifying lens.



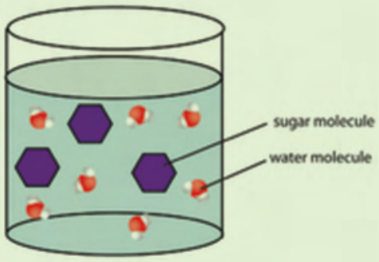
A	B	C	D	E	F

Which of the shapes given above resemble a sugar crystal?

A B C D E F

Now place a few sugar crystals into water.

What happens to the sugar crystals?



A sugar crystal is also made up of molecules. When sugar dissolves in water, the sugar crystals break down and the molecules of sugar get distributed in water. This makes water sweet in taste. The sugar molecules are extremely small; that is why we are not able to see them. Small amount of matter has many millions of molecules in it (1 million = 10 lakhs).

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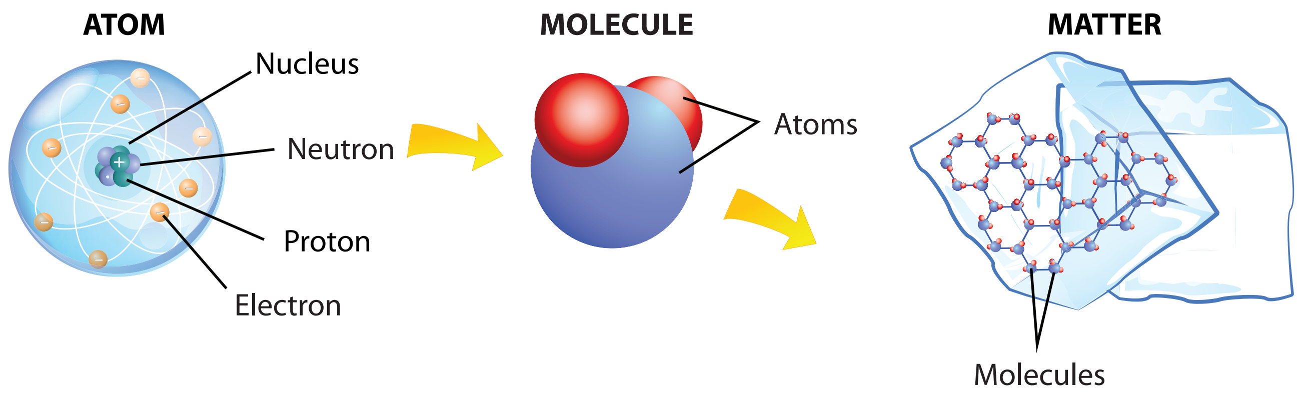

Characteristics of the particles of matter

1. Particles of matter have a lot of space in between them. In different forms of matter this spacing will be different.

Let us add a spoon full of sugar to a glass of water. Stir well. Sugar disappears completely. Where has it gone? Will the glass of water be now sweet? Water particles have space between them and sugar particles are now occupying those spaces.

2. Particles of matter attract each other.

It is the force of attraction which keeps the particles together. This attractive force will be different for different forms of matter.

Grouping of Matter on the basis of Physical states

These are the three physical states of matter. Matter can be grouped into solids, liquids and gases based on the above characteristics.

3.2 Mass, Shape and Volume of Solids, Liquids and Gases

Let us first take any solid say a stone: Answer the following questions.

- ❖ Do you need a container to know the shape of a stone ? Yes / No

A solid does not need a container. It stays as it is because its particles are tightly packed and has a definite shape.

- ❖ If you move the stone from the ground to a table or place it on the shelf does it's shape change? Yes / No

If you take a stone from the ground and place it on the table or shelf its shape and volume do not change.

Activity 2

Sit together in groups of three. Look at the objects given below. Are they familiar to you? Are they same or different? On what basis you can group them? Is there only one way of doing it or more ways? Discuss with your group members and note down your points.

Pencil and books are used for studying. The bucket and the comb are made of plastic while the table and ladle

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are made of wood. The scrub brush and broom are rough but the toy bear is soft. Light can pass through a glass of water and the spectacles but not through apple or iron box. The cow and the bird are living things while the rest are not. Water in the glass is liquid but air in the balloon is gas and the rest are solids. The feather and the paper cup can float but not the apple or the piece of stone. The rubber band can be stretched but not the comb. Though they have different properties, they are matter.

Try to fill in the following table

You can group them according to their uses, the materials with which they are made of or some other properties.

S.No	Things that float	Things that sink
1.		
2.		
3.		

Try to make more such tables based on the properties discussed above. How many tables could you make?

How did you classify the items in the above list as solids, liquids and gases?

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You should have done it based on some properties. Brick and door which are hard come under solids, things that flow come under liquids and others which are very light and can flow more freely come under gases.

Activity 3

Malar was asked to group some items based on their physical states. The table she made is given below. Do you agree with her? Correct the table if you do not agree and submit it to your teacher. (Work in a group of two.)

Chalk piece	Wind	Steam
Water	Rain	Lemon
Air in a balloon	Stone	Lemon juice
River	Air	Smoke
Brick	Table	Door

3.3 Diffusion

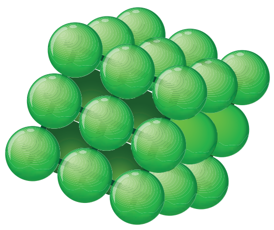
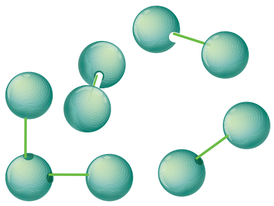
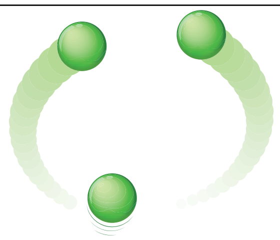
Let us place a book on a table. Let it not be disturbed. Observe for five minutes. Now take a glass of water and add a drop of ink carefully at the centre. Do not shake or stir.

Now light an incense stick and keep it in one corner of the room.

Let us answer the following questions.

- Did the book move?
- Did the ink particles move and spread itself in the water? How long did it take for complete mixing?
- Did you get the smell of the incense stick from where you are standing?
- How fast did you get the smell? How did the smell reach you?

We may conclude that the particles of gases and liquids can move easily and quickly. This tendency of particles to spread out in order to occupy the available space is called diffusion. Solids are tightly packed and they do not diffuse like liquids or gases. Hence ink and smoke spread easily while book stays on the table.

Particles in a Solid	Particles in a Liquid	Particles in a Gas
		
In solid, the particles are tightly packed with very little space between them. Eg. Stone	Particles in liquids are arranged in a random or irregular way and the space between the particles is greater than that is in solids. Eg. Water	The particles in the gases are arranged far apart. They move freely. Eg. Air

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Activity 4

Let us take two sachets of juice. In both the sachets, it is written 100ml. Let us empty two sachets and pour the juice into the following glasses.

- Does its shape change? Yes / No

  A liquid needs a container and it takes the shape of a container because the particles slide over one another and keep moving.

- Does its volume change when it is poured into a big glass as well as a small one? Yes / No

  The amount of juice is the same in both glasses.

- How will you find out whether the volume has changed or not?

  The volume of a liquid remains the same whether it is kept in a large container or a small one but its shape changes.

Activity 5

Lift an uninflated cycle tube. Inflate it and now lift it again. Is there a change in the weight? Can we say that air has mass?

We can say that air is also a matter. Though we cannot see it, it occupies space and also has mass. Let us try to know more about matter.

Test Yourself

1 Name an object which is brittle and transparent. ____________

2. Name an object which can be stretched.

____

3. Name two objects which can be bent.

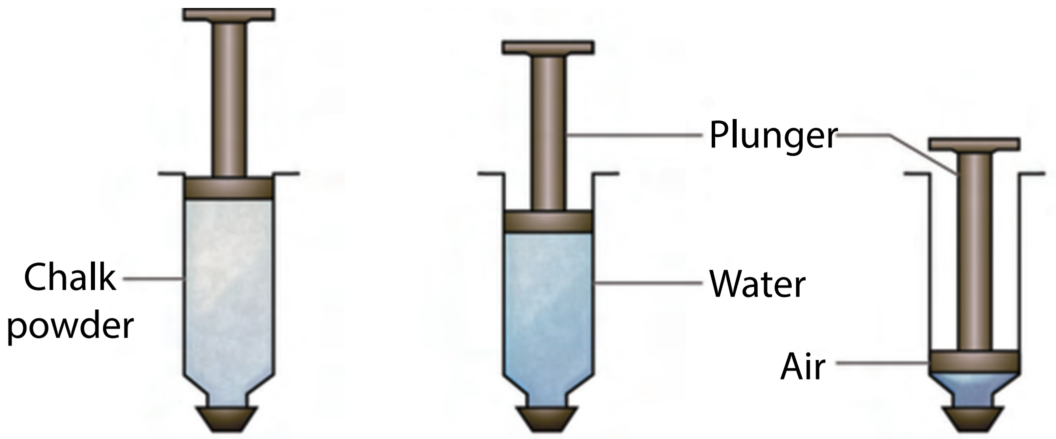
____

3.4 Compressibility of gases compared to liquids and solids

Let us take three identical syringes. Close the nozzles tightly with a cork. After removing the plunger first let us fill it with fine chalk powder. Try to press plunger down. What do you observe?

Now let us fill the second one with water. Press the plunger down. What do you observe? Let us now draw the piston back to suck air into the third one. Press the plunger down. What do you observe? Is it easy or hard to press? Record your observations and share among the group members.

You would have observed that the plunger moved freely in syringe with air than in water. It was difficult to press the liquids and the piston hardly moved in chalk powder. Thus, we can conclude that gases are highly compressible as compared to liquids and solids.



Solids are not compressible **Liquids are hardly compressible** **Gases are compressible**

Think to learn

Solid ⟶ Liquid ⟶ Gas

'Liquefaction of gases' is the process by which substances in their gaseous state are converted to the liquid state. When the pressure on a gas is increased, its molecules come closer together, and the temperature is reduced. This removes enough energy to make it change from the gaseous state to the liquid state.

Lets summarize

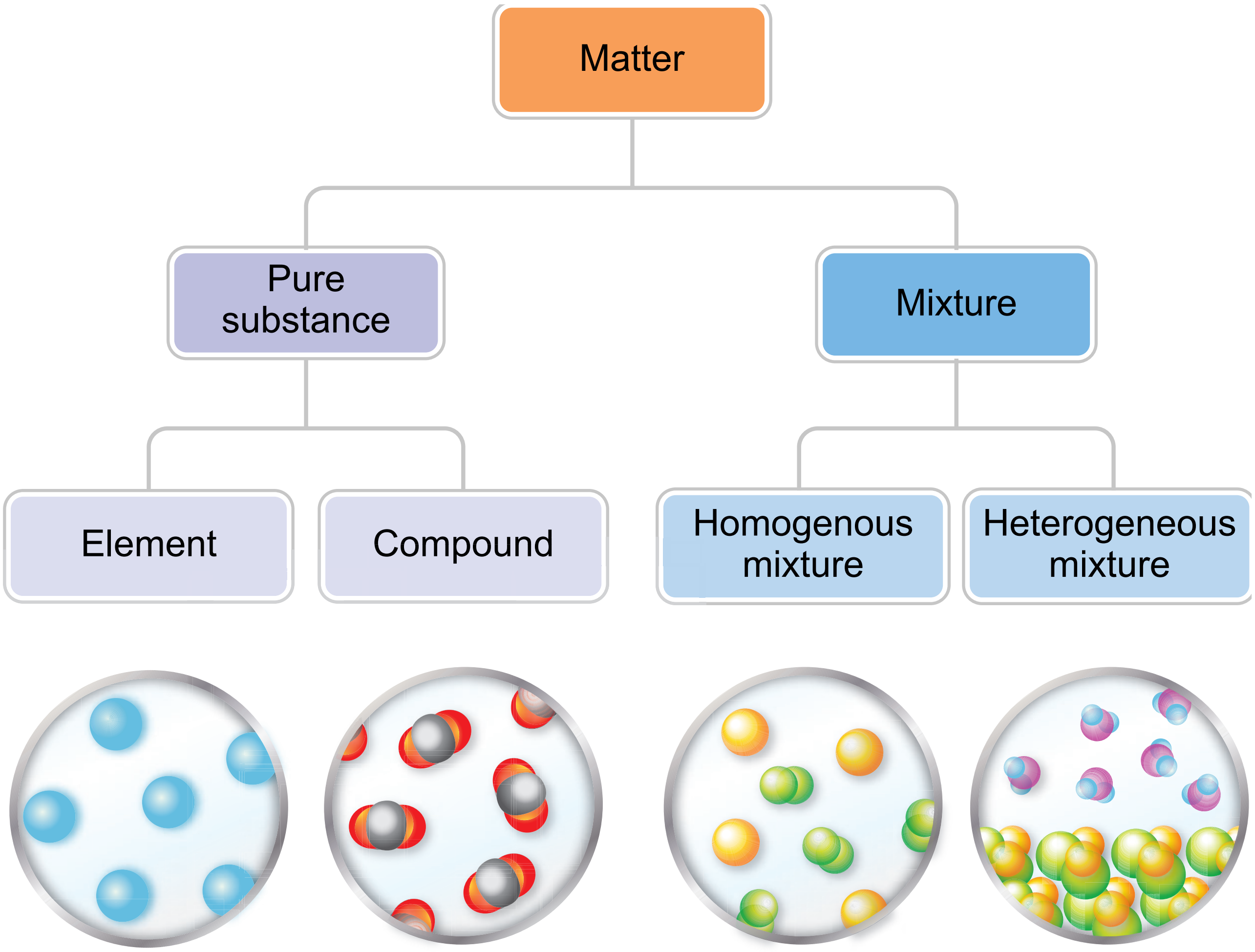
S.no.	Solids	Liquids	Gases
1.	Definite shape and volume	No definite shape. Liquids attain the shape of the vessel in which they are kept.	Gases have neither a definite shape nor a definite volume.
2.	Incompressible	Compressible to a small extent.	Highly compressible
3.	There is little space between solid particles. Particles are tightly packed or arranged.	These particles have a greater space between them. Particles are not tightly packed or arranged. They are free to move.	The space between gas particles is the greatest. Particles are very loosely packed or arranged.
4.	These particles attract each other very strongly.	The force of attraction between liquid particles is less than solid particles.	The force of attraction is least between gaseous particles.
5.	Particles of solid cannot move freely.	These particles move freely.	Gaseous particles are in a continuous, random motion.

3.5 Pure Substances and Mixtures

In shops, we find products which are sold with label 100% pure! For common people pure means unadulterated, does not contain any cheap or harmful additives. Are they really pure substances as they claim to be?

For a Chemist the word 'pure' means something else!

- A pure substance is made up of only one kind of particles.
- Pure substances may be elements or compounds.
- An element is made up of same kind of atoms.
- A molecule consists of two or more atoms.
- Compound is the substance formed by the chemical combination of two or more elements.
- Mixture is a physical combination of two are more substances.



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Let us consider the following examples. We all eat snacks. Can you identify and mention a few things that are present in a mixture or fruit mixture? You are able to identify the ingredients in them from their colours, appearance or taste.

We mix rice, dal, salt, chillies, pepper, ghee and other ingredients to make pongal. Pongal is also an example for mixture.

Why do we call these as mixtures? Because they are made of two or more ingredients or components that are physically separable.

Explore

Can we always see the different components of the mixture with our naked eyes?

Let us compare the vegetable salad and soda water. In vegetable salad the individual vegetable can be separated physically. In soda water we can neither see nor separate the components physically.

Vegetable salad

Soda water

Try it yourself

Identify the mixture given in the table below. Write 'yes' for a mixture and 'no' if it is not a mixture. You may also write 'I do not know' and later discuss with your teacher.

Mixture	**Yes / No**
Borewell water	
Copper wire	
Sugar cube	
Salt Solution	

Air is a mixture because it contains oxygen, nitrogen, carbon dioxide, water vapour, noble gases and other gases. Milk is also a mixture. It contains water, fat, protein etc.

Lemon juice is a mixture. Some of us like to have it with less sugar; while others like to have it with more sugar. But either way, it is still lemon juice - prepared from lemon extract, water and sugar and is a mixture though the amount of sugar added is different. Same way even if we add extra

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water or lemon extract it will still be a mixture. A mixture need not have a fixed proportion of components.

- A mixture is an impure substance and contains more than one kind of particles.
- In the mixture the components are mixed in any proportion.

A mixture can be a physical combination of two or more elements. Example: 22 carat gold which is composed of gold and copper or gold and cadmium.

It can be a physical combination of two or more compounds. Example: Aerated drink which is composed of carbon dioxide, water, sweetening and colouring agents.

It can be a physical combination of an element and a compound. Example: Tincture of iodine is composed of Iodine in alcohol.

3.6 Separation of Mixtures

Are all mixtures used as they are? Or is there a need for separating the components? Materials we use in our day-to-day life are got from different sources and are very often combined with other substances.

Mixtures like coffee and ice cream are taken as such. There is no need for separation of this substances. Metals occur in the form of ores under the earth's crust. But if we want to use a pure metal, we need to adopt a laborious process of extraction to separate the useful metal from the ore.

What is meant by separation? The process by which the components of mixture are isolated and removed from each other to get pure substance is called separation. To know about the original properties and uses of the individual substance we need separation.

When and why do we need to separate mixtures?

- ❖ When we need to remove impurities or harmful components from the mixtures. Eg. Stones from rice.
- ❖ When the useful component has to be separated from other components. Eg. Petrol from petroleum.
- ❖ When a substance has to be obtained in highly pure form. Eg. Gold from gold mines.

Let us visit Selvi's Family

It is 7 am and Selvi's family is busy. At home, in the kitchen, Selvi's mother is making tea for the family and her grandmother is separating butter from curds. Her father and uncle are out in the field collecting paddy after harvesting. Selvi is helping her mother to cook rice and is separating stones from the rice. Selvi's little brother Balu is fascinated by a piece of magnet that was given by his friend and is playing outside in the sand with it.

Can you list out in your note book, the different activities that Selvi's family members are engaged in?

Let us explore the different separating methods involved in the above activities and also learn about a few other methods.

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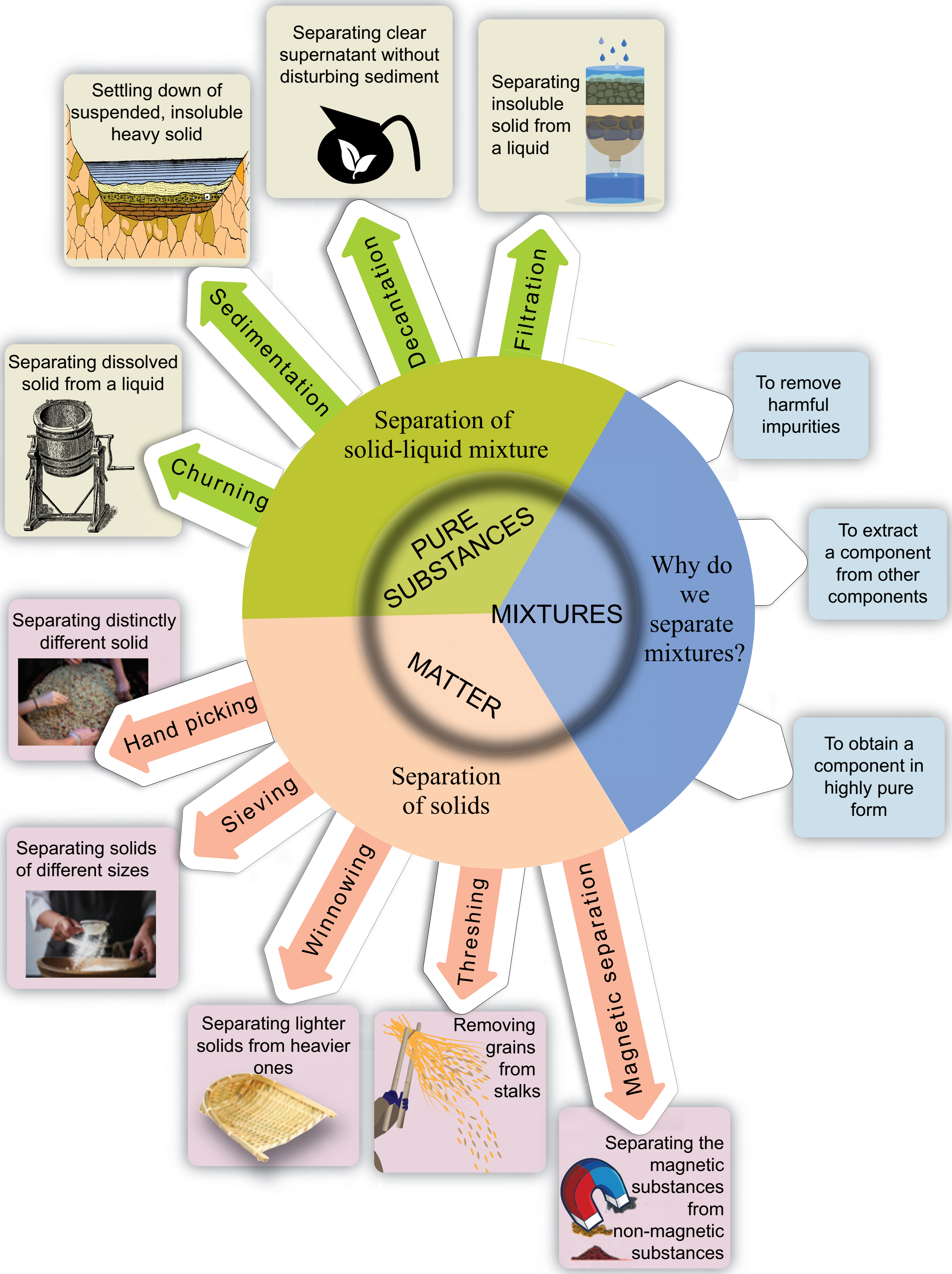
Separation Techniques



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The choice of the method of separation depends upon the properties of the components of the mixture. The separation method may be based on the particle's size, shape or physical state – solids, liquids or gases.

Filtering

Selvi's mother used a strainer to remove the tea leaves to get the clear liquid. Larger sized particles of tea leaves will be retained by the strainer while the clear liquid will pass through. This is called **filtering.**

Will you discard the tea leaves after straining? Can you suggest a good way of using them?

Sieving

A sieve is similar to a strainer. **Sieving** is used when we have to separate solid particles of different sizes. Eg: bran from flour, sand from gravel etc. Wire mesh as a strainer sieve is used to separate gravel from sand at a construction site.

Activity 6

Think and find, is it a good idea to separate bran from flour?

Churning

When very fine insoluble solids have to be separated from a liquid as in butter from curd, **churning** is performed.

The mixture is churned vigorously when solid butter will be collected on the sides of the vessel. Both butter and butter milk obtained after churning are useful and can be consumed.

DO YOU KNOW?

In washing machines water is squeezed out from clothes and they are dried. This method is called centrifugation.

Threshing

When we pluck flowers from plants, we are separating the flowers from their

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stalks. Can we do the same for food grains like rice and wheat? It is not possible because the grains are small in size and also the quantity is very large. Farmers separate grains from their stalks by beating them hard. The grains are separated from their stalks. This is called **Threshing.**

Winnowing

Rice, wheat and other food grains are covered with husk which cannot be eaten by us. Husk is very light and gets easily blown away by a breeze or wind. The method used for removing husk from grain is called **winnowing.**

This is done by dropping the mixture slowly from a height in the presence of wind. Lighter solids i.e. husks will be carried by wind and will be collected in a separate heap while heavier solids i.e. grains will fall closer and form a separate heap.

DO YOU KNOW?

Rice husk also called chaff is the hard coating or protective covering on a seed or grains. It protects the seed during the growing season. Husk can be used as building material, fertilizer, insulation material and fuel.

Handpicking

How do we separate a stone from `rice? If the stones are visible different from the grain, they can be easily picked and separated by hand. This is called **handpicking**. But if the stones look very similar to the rice grains it is difficult to separate.

Magnetic Separation

In a mixture containing iron, the magnetic property of iron can be used to separate it from non- magnetic substances by using a magnet. Substances that are attracted to a magnet are called magnetic substances. Separating solids using a magnet is called **magnetic separation.**

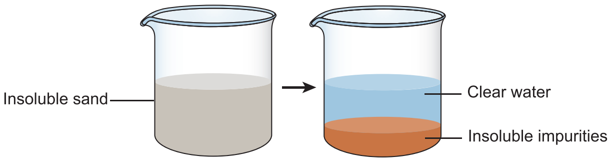
Sedimentation

Rice and pulses are often mixed with very fine straw, husk or dust particles which have to be removed before cooking. Are you familiar with the way this is done at home? To remove these particles rice or pulses are washed in water. The lighter impurities float while heavier rice grains sink to the bottom. This is called **sedimentation**. The water with the impurities is carefully poured down leaving clean rice at the bottom. This is called **decantation.**

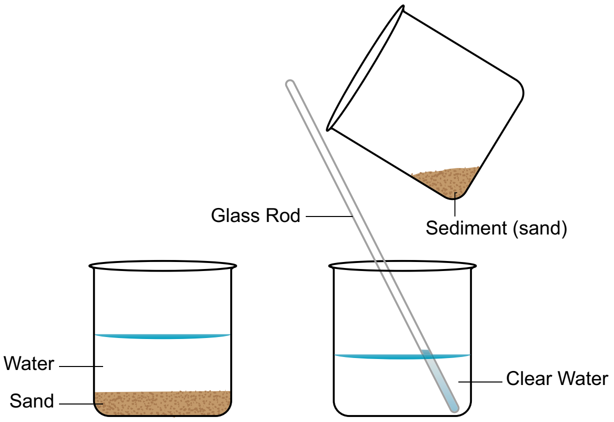
Separating mud from muddy water

Muddy water is a mixture of very fine particles of soil in water. What will happen if muddy water is left undisturbed for some time? Mud being heavy will settle down at the bottom of the beaker and will form the sediment. Water forms the top layer and is called the supernatant liquid.

Sedimentation



Decantation



The settling down of heavier components of a mixture when allowed to remain undisturbed for some time is called sedimentation.

Decantation

This process is done after sedimentation. The supernatant liquid is slowly poured out from the container without disturbing the sediment. The part that settles down the bottom of the liquid is called sediment. The water that is obtained after decantation is called the decantate. The process of separating liquid above the sediment is called decantation.

But even after decantation the water is not completely free from fine soil particles. How can we remove this? We can do this by filtration. Do you think a strainer or a cloth can filter theses very fine particles? Do it by yourself and find out.

Filtration

We use filter papers to remove the finer impurities. A filter paper has very fine pores much smaller than soil particles. Let us see how to use the filter paper.

Take a piece of filter paper. Fold it to make a cone (see figure). Slowly pour the muddy water over the filter paper. On filtration clear water (filtrate) flows down the funnel and mud settles as residue on the filter paper. The method of separating insoluble component (sand, mud etc.) from a mixture using a filter paper is called filtration. The liquid which passes through the filter and comes down is called **filtrate** and the insoluble component left behind on the filter paper is called **residue**.

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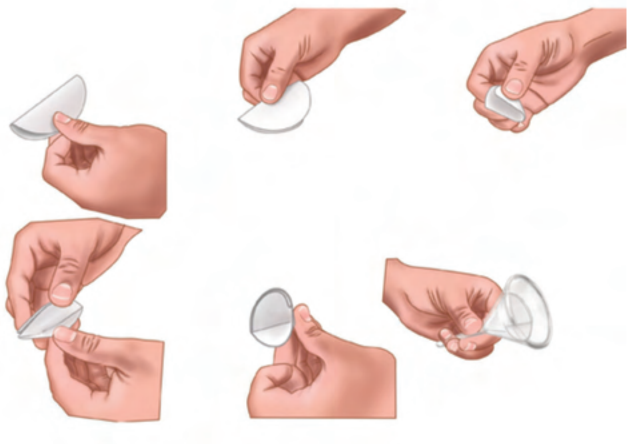
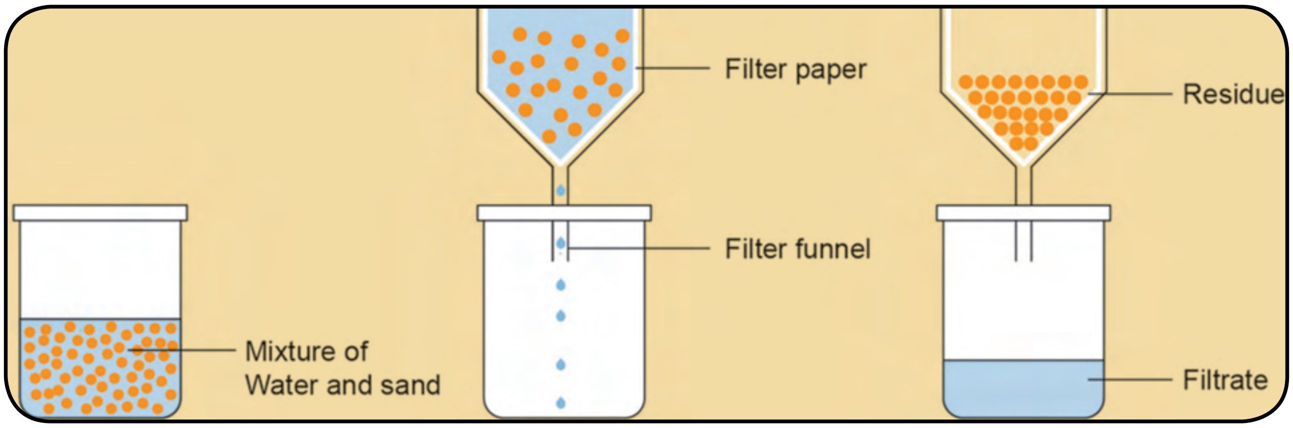


More to know:

Combination of methods are used sometimes for complete separation.

If the mixture of sand and salt in water has to be separated several methods like sedimentation, decantation, filtration, evaporation and condensation are used.



Activity 7

Group Activity – Students are divided into four groups

Each group should suggest a method to separate mixtures and also give reasons why they used a particular method and what property of the components forms the basis for separation. **Examples should be drawn from day-to-day life.** After the group presents its method to the rest of the class, the whole class will discuss and analyse if the suggested method will work and then make a note of it in the table given below.

Separation Method	Example	Basis For Separation

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3.7 Food Adulteration

Sometimes, things that we buy in the market are mixed with harmful and unwanted substances. It is called adulteration. Food can also get adulterated due to carelessness or lack of proper handling.

We must be careful about the common adulterants in our consumable goods especially in food. Any adulterated food when consumed will be harmful and can be a health hazard.

An adulterated substance will not indicate the true properties of the original substance. For example, used tea leaves are sometimes used as adulterants in tea. Turmeric powder is adulterated with a bright yellow chemical which is poisonous to us.

Do You Know?

In most houses people use commercial water filter to remove not only the impurities but also to kill the harmful germs in water using UV rays.

Reverse Osmosis (RO) is a process of removing impurities from water to make it potable.

Activity 8

Collect and share information on common adulterants and their detection in food stuff in the class. Watch the youtube video: 10 simple tricks to find adulterated food. https://www.youtube.com/watch?v=_XLi WunnudY

Points to Remember

- Matter is anything that has mass and occupies space.
- All matter is made up of extremely small particles called atoms.
- Matter is classified into solids, liquids and gases on the basis of two important factors.
  a. The way the particles are arranged
  b. The way the particles attract each other.
- Difference between the properties of solids, liquids and gases is due to the difference in the arrangement of the particles and the nature of the attractive forces between them.
- A pure substance can be an element or a compound and it can be made up of only one kind of particles.
- A mixture is an impure substance containing two or more components physically mixed in any proportion.
- Separation of mixtures is done
  1. to remove harmful components.
  2. to obtain the useful components.
  3. to obtain a substance in a highly pure form.

- Different separation methods are adopted depending on the properties of the components.
- Handpicking – Particles reasonably large in size to be recognised can be picked by handpicking.
- Winnowing – Adopted to separate lighter solids from heavier ones.
- Magnetic separation – Separating magnetic substances from non-magnetic substances.
- Sedimentation – Settling down of suspended, insoluble and heavy solid particles (used to separate solid – liquid mixtures).
- Decantation - Process of pouring out the clear supernatant liquid without disturbing the sediment.
- Filtration – Process of separating insoluble solid particles (residue) from a liquid (filtrate) by using a filter paper.
- Adulteration – Making things impure by the addition of a foreign or inferior substance.

Evaluation

I. Choose the correct answer.

1. ____________ is not made of matter.

   a. Gold ring b. Iron nail
   c. Light ray d. Oil drop

2. 200 ml of water is poured into a bowl of 400 ml capacity. The volume of water will be ____________

   a. 400 ml b. 600 ml
   c. 200 ml d. 800 ml

3. Seeds from water-melon can be removed by ____________.

   a. hand-picking
   b. filtration
   c. magnetic separation
   d. decantation

4. Lighter impurities like dust when mixed with rice or pulses can be removed by ____________.

   a. filtration b. sedimentation
   c. decantation d. winnowing

5. ____________ is essential to perform winnowing activity.

   a. Rain b. Soil
   c. Water d. Air

6. Filtration method is effective in separating____________ mixture.

   a. solid-solid b. solid-liquid
   c. liquid-liquid d. liquid-gas

7. Among the following ____________ is not a mixture.

   a. coffee with milk
   b. lemon juice
   c. water
   d. ice cream embedded with nuts

II. Fill in the blanks.

1. Matter is made up of ____________
2. In solids, the space between the particles is less than in ____________.

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3. Grains can be separated from their stalks by ____________

4. Chillies are removed from 'Upma' by ____________ method.

5. The method employed to separate clay particles from water is ____________

6. Water obtained from tube wells is usually ____________ water.

7. Which among the following ____________ will get attracted to by magnet? (safety pins, pencil and rubber band)

III. State True or False. If false, correct the statement.

1. Air is not compressible.

2. Liquids have no fixed volume but have fixed shape.

3. Particles in solids are free to move.

4. When pulses are washed with water before cooking, water is separated from them by filtration.

5. Strainer is a kind of sieve which is used to separate a liquid from solid.

6. Grain and husk can be separated by winnowing.

7. Air is a pure substance.

8. Butter from curd is separated by sedimentation.

IV. Complete the given analogy.

1. Solid : Rigidity :: Gas : ____________.

2. Large Inter-particle space : Gas :: ____________ : solid.

3. Solid : Definite shape :: ____________ : Shape of the vessel.

4. Husk-Grains : Winnowing :: Sawdust-Chalk piece : ____________

5. Murukku from hot oil : ____________ :: Coffee powder residue from decoction : ____________

6. Iron – sulphur mixture : ____________:: Mustard seeds from Urad-dhal : Rolling

V. Match the following.

a)

Property	Example
Breaks easily (Brittle)	Metal pan
Bends readily	Rubber band
Can be stretched easily	Cotton wool
Gets compressed easily	Mud pot
Gets heated readily	Plastic wire

b)

	A	B	C
i	Separation of visible undesirable components	Water mixed with chalk powder	Magnetic Separation
ii	Separation of heavier and lighter components	Sand and water	Decantation
iii	Separation of insoluble impurities	Iron impurities	Filtration
iv	Separation of magnetic components from non- magnetic components	Rice and stone	Hand-picking
v	Separation of solids from liquids	Husk and paddy	Winnowing

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VI. Answer very briefly.

1. Define the term matter.
2. How can husk or fine dust particles be separated from rice before cooking?
3. Why do we separate mixtures?
4. Give an example for mixture and justify your answer with reason.
5. Define - Sedimentation.
6. Give the main difference between a pure substance and an impure substance.

VII. Answer briefly.

1. A rubber ball changes its shape on pressing. Can it be called a solid?
2. Why do gases not have fixed shape?
3. What method will you employ to separate cheese (paneer) from milk? Explain.
4. Look at the picture given below and explain the method of separation illustrated.

5. How can you separate a large quantity of tiny bits of paper mixed with pulses / dal?
6. What is meant by food adulteration?
7. Mr. Raghu returns home on a hot summer day and wants to have buttermilk. Mrs. Raghu has only curd. What can she do to get buttermilk? Explain

VIII. Higher Order Thinking Questions.

1. Distinguish the properties of solid, liquid and gas. Draw a suitable diagram.
2. Using suitable apparatus from your laboratory separate the mixture of chalk powder, mustard oil, water and coins. Draw a flow chart to show the separation process.
3. Justify your answer.

Figure 1

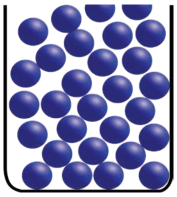


Figure 2

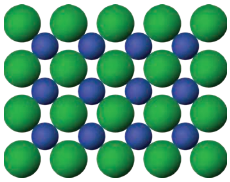
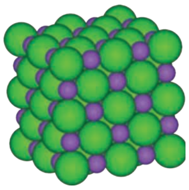


Figure 3



Arrangement of particles in three different phases of matter is shown above.

a) Which state is represented by Fig. 1?

b) In which state will the inter particle attraction be maximum?

c) Which one of them cannot be contained in an open vessel?

d) Which one can take the shape of its container?

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4. Malar’s mother was preparing to cook dinner. She accidentally mixed ground nuts with urad-dhal. Suggest a suitable method to separate the two substances so that Malar can have ground nuts to eat.

5. In a glass containing some water, tamarind juice and sugar is added and stirred well. Is this a mixture? Can you tell why? Will this solution be sweet or sour or both sweet and sour?

IX. Life Skills - Debate

1. Debate on 'Food adulteration and detection'

X. Field Trip

1. Visit a nearby paddy field and rice mill and note down the different separating techniques used there. Is technology replacing some traditional practices?

Watch you tube video in the given link

https://www.youtube.com/watch?v=9Djc5ZVUyUw

https://www.youtube.com/watch?v=DJGRJ4qL4-A

XI. Sequence Type

1. Write the sequence of steps you would use for making tea. (Use the words : mixture, dissolve, filtrate and residue).

XII. Topic enrichment – Project

1. Make a fruit or vegetable salad. Give reasons why you think it is a mixture.

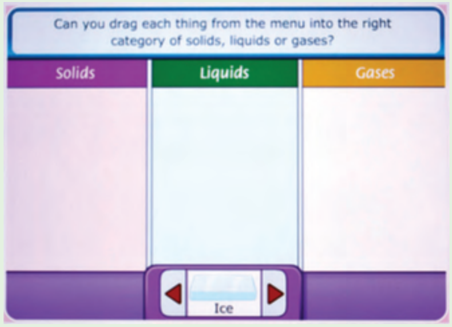
2. Connect with sports

   Air is not a pure substance. It helps us in many ways from breathing to playing. Balloon sports are a very popular sport. Hot air is lighter than cool air. So, the balloons filled with hot air rise up. Find out more about hot air balloons.

ICT Corner

Types of matter

Lets play with
Science kids

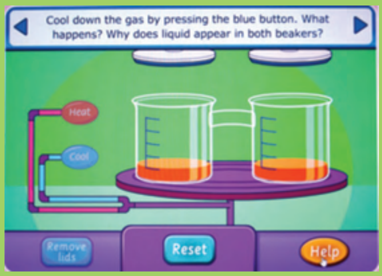


Step 1: To learn more about the matter around us type Science Kids in the Google browser and select games Go inside and select matter. Now the following logo can you drag will appear on the screen. Then click ok.

Step 1: Three divided columns will appear on the screen. The first section is for solid and the second section is for liquid and the third one is for gas. Now when we press this symbol, at the bottom items will appear at the bottom. We have to drag them to their respective column.

Step 1

Step 2



Step 3

Types of matter URL:

http://www.sciencekids.co.nz/gamesactivities/gases.html

*Pictures are indicative only

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Unit 4

The World of Plants

Learning Objectives

- ❖ To know about the varieties of plants.
- ❖ To know about the parts and functions of plants.
- ❖ To know the different forms of leaves, functions and their modifications.
- ❖ To understand that the food manufactured by plants is consumed by animals and human.
- ❖ To know the different types of habitats.
- ❖ To understand that plants exhibit adaptations and modifications based on the habitat.
- ❖ To know that life forms depend on each other.

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Introduction

Rani and Ravi went to vegetable market with their mother. They saw variety of fresh green vegetables with attractive colours. Their mother bought cauliflower, cabbage and raddish. Ravi asked his mother 'Mom, do all the vegetables grow under the soil?' His mother answered, "No Ravi, we get some vegetable from stem, some from roots. Even some flowers are used for cooking". Rani and Ravi were surprised to know that vegetables are from different parts of the plant. After returning home they sorted out all vegetables from the bag and discussed which vegetable is from stem, which is from root and which is from flower. Their mother collected keezhanelli, curry leaves, and coriander leaves from the garden and said that the purpose of using these leaves in cooking is to add medicinal value and aroma. Discuss with your teacher about the pictures given below.

Biology is a natural science concerned with the study of life and living organisms, including their structure and functions. The living world comprises of plants and animals. Plants can prepare food by themselves, grow in size, and reproduce. Various parts of the plants are used as food, medicine, wood, and shelter.

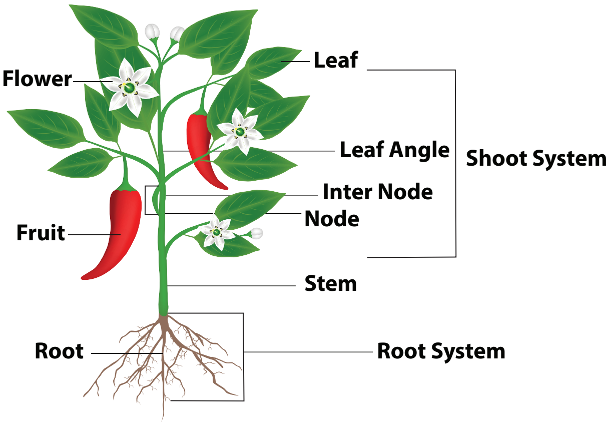
4.1 Plant forms and functions

Our body is made up of many organs. Similarly the plant body is also made up of several organs such as **root**, **stem, leaves** and **flowers**. Plants are of many forms and many colours, yet they are alike in some manner. That is, they all have stems and leaves above the ground which we can see easily and roots below the ground.

As shown in the picture, a flowering plant consists of two main parts. They are,

1. Root system.
2. Shoot system

Let us learn about them in detail.



1. Root System

The underground part of the main axis of a plant is known as **root**. It lies below the surface of the soil. Root has no nodes and internodes. It has a root cap at the tip. A tuft of root hairs is found just above the root tip. Roots are positively geotropic in nature

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Root system is classified into two types.

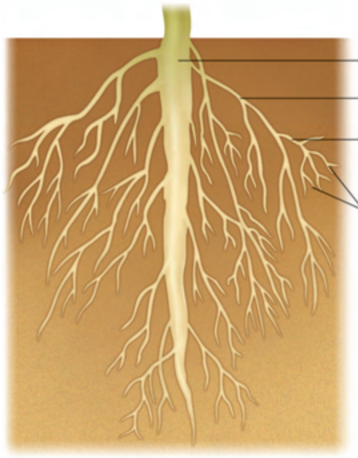
a. Taproot system

b. Fibrous root system

a. Taproot system

It consists of a single root, called **taproot**, which grows straight down into the ground. Smaller roots, called lateral roots arise from the taproot. They are seen in dicotyledonous plants.

Example: Bean, Mango, Neem.



b. Fibrous root system

It consists of a cluster of roots arising from the base of the stem. They are thin and uniform in size. It is generally seen in monocotyledonous plants.

Example: Grass, Paddy, Maize.

Fibrous Root of Grass

Activity 1

Water absorption by Root

Aim: To observe absorption of water by root.

What you need? A carrot, a glass of water and blue ink.

What to do? Place a carrot in a glass of water with a few drops of blue ink. Leave the carrot in water for two to three days. Then cut the carrot into half length wise and observe.

What do you learn? Blue colour appears in carrot which indicates the upward movement of water in the carrot showing that root conducts water.

Functions of the Root

- Fixes the plant to the soil.
- Absorbs water and minerals from the soil.
- Some plants like carrot and beet root store food in root.

Guess it

Is it a root or stem?

2. Shoot system

The aerial part of the plant body above the ground is known as the **shoot system**. Main axis of the shoot system is called the **stem**. The shoot system consists of stem, leaves, flowers and fruits.

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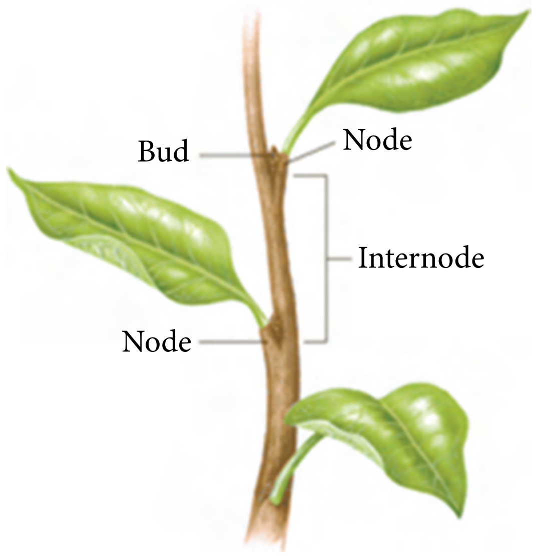
Stem

Stem grows above the soil, and it grows towards the sunlight. It has nodes and internodes. **Nodes** are the parts of stem, where leaf arises. The part of the stem between two successive nodes is called **internode.** The bud at the tip of the stem is known as apical or **terminal bud**, and the buds at the axils of the leaves are called **axillary buds**.



Activity 2

Conduction of water

Aim: To observe conduction of water by stem.

What you need? A small twig of balsam plant, a glass of water and a few drops of red ink.

What to do? Place the small twig in the water with red ink.

What do you see? The stem becomes reddish.

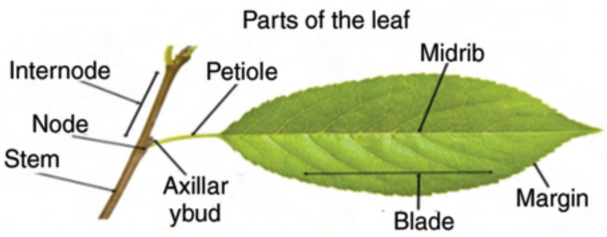
What do you learn? This is because red coloured water is being absorbed by the stem upwards.

Functions of the stem

- ❖ Supports the branches, leaves, flowers and fruits.
- ❖ Transports water and minerals from roots to upper aerial parts of the plant.
- ❖ Transports the prepared food from leaves to other parts through stem.
- ❖ Stores food as in the case of sugarcane.

Leaf

The leaf is a green, flat expanded structure borne on the stem at the node.



A leaf has a stalk called **petiole**. The flat portion of the leaf is called **leaf lamina** or **leaf blade**. On the lamina, there is a main vein called **midrib**. Other veins are branched out from mid rib. The portion of the leaf connected in the nodal region of the stem is known as the **leaf base**. Leaves of some plants possess a pair of lateral outgrowth on the base, on either side of axillary bud. These are called **stipules**.

The green colour of the leaf is due to the presence of green coloured pigment called **chlorophyll**. On the lower side of the leaf there are tiny pores or openings known as **stomata**.

Functions of the Leaves

- ❖ The green leaves prepare food by photosynthesis.
- ❖ They help in respiration.
- ❖ They carry out transpiration.

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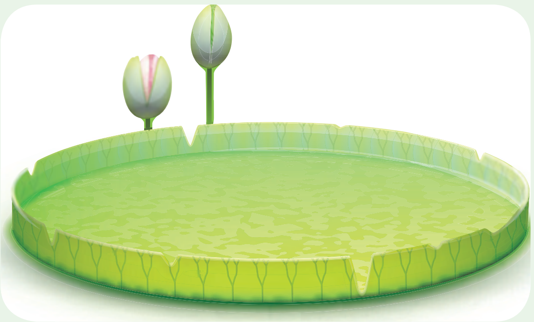
DO YOU KNOW?

The leaves of ***Victoria amazonica*** plant grows upto 3 metres across. A mature Victoria leaf can support an evenly distributed load of 45 Kilograms or apparently young person.



Think to learn

How do we classify the plants?

1. Based on flower, plants can be classified into two main groups. They are: Flowering plants and Non-flowering plants.

Sun Flower
(Flowering plant)

Riccia
(Non-Flowering plant)

2. Based on the presence of seed coat, plants can be divided into two groups. Angiosperms (Seeds are enclosed within a fruit) and Gymnosperms (Seeds are not enclosed within a fruit)

Mango (Angiosperm)

Cycas (Gymnosperm)

Activity 3

The teacher has to divide students into four groups. Each group leader will get a paper having the plant part (roots, stems, leaves, and flower) written on it, from the teacher. The teacher will take students around the campus to search for their assigned plant parts. They have to locate different types of plants discussed in the class room. The students will return to the class and discuss among themselves to create a poster. For example, flower group will create a poster by identifying correctly each part of the flower. Each group will share their posters within the class.

4.2. Habitat

Activity 4

Read the following story along with your friend

Once, I was a happy monkey. I lived in a beautiful thick forest with my mother and two brothers. We ran and played in the lush grass. On one hot day, I fell fast asleep in the cool shade of a tree. Suddenly the bright sun woke me up. I opened my eyes and could not believe what I saw. Everything has changed. Everything had been destroyed. I stood and looked at the stumps that used to be trees. Nothing was left apart from hard dry ground and only streets and building. I saw a deer that looked very sad. 'Where have all the trees gone and where are all the other animals?' I asked her.

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She explained how humans had chopped down all the trees, but had not planted new ones to replace them. After a while, I said good bye to the deer. My home is gone. I didn't know where my family is, and I was hungry and thirsty, day and night. I walked in search of water, food and safe place to sleep. Whenever I stopped to rest, humans drove me away with sticks and angry voices. I could feel my body getting weak and tired. One day when I had almost given all the hope, I came across a cool and dark forest. As I walked through it, I found plenty of food and water. The forest was safe for me. There were no signs of human visiting it.

- Why did the deer feel sad?
- Who chopped the trees?
- Which is the safest place for monkey to live?

What is a habitat? Each and every organism needs a place to live and reproduce. Such a dwelling place is called habitat. From the depths of the ocean to the top of the highest mountain, habitats are the places where plants and animals live.

Types of Habitats

Let us study the two major types of habitats.

I. Aquatic habitat

When we visit a pond, we see some plants appear to float on water. One of the common plants is the Lotus plant. Its leaves float on the water. There is a small frog sitting on a leaf. It is ready to catch the insects flying / fluttering around the flowers. The stem of the plant is seen to be inside (submerged) the water. Its roots are found within the muddy floor of the pond. As this plant grows in water, shall we call it an **aquatic plant**?

Aquatic habitat includes areas that are permanently covered by water and surrounding areas that are occasionally covered by water. There are two types of habitat namely fresh water habitat and marine water habitat.

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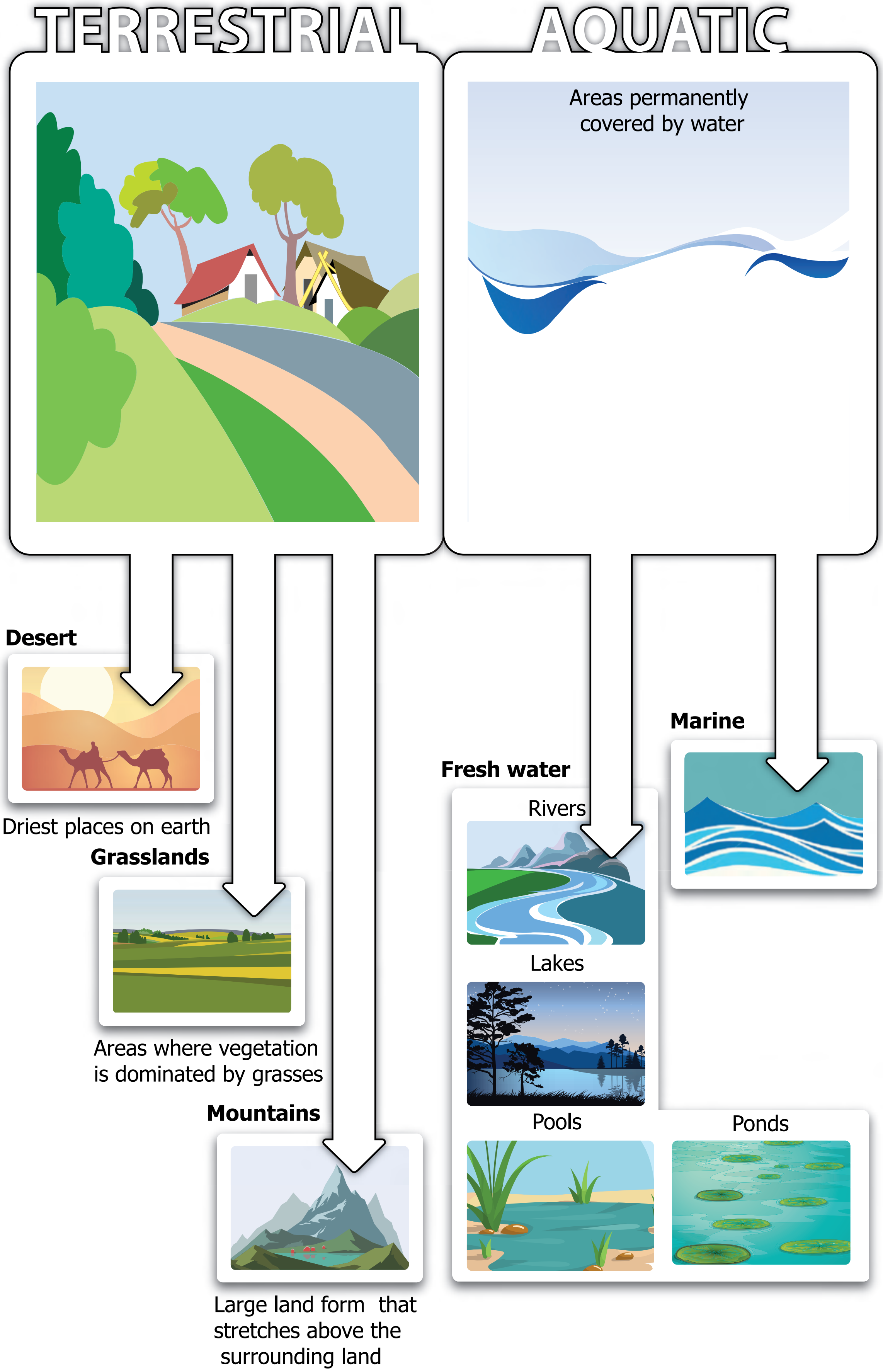
Types of habitat



a. Fresh water Habitat

Rivers, lakes, ponds and pools are the fresh water habitats. Water hyacinth, water lily and lotus are seen in the fresh water habitat. In these plants roots are very much reduced in size. Stem and leaves have air chambers that allow aquatic plants to float in water.

DO YOU KNOW?

Air spaces in stems and petioles of lotus are useful for floating in water

b. Marine water habitat

From outer space Earth looks like an awesome blue marble, that's because more than 70% of Earth's surface is covered by oceans. Oceans also supports the growth of plants. Marine plants perform about 40% of all photosynthesis that occurs on the planet.

Example: Marine algae, Sea grasses, Marsh grass, Phytoplanktons.

DO YOU KNOW?

- Nile is the longest river in the world. It is 6650 Km long.
- The Longest river in India is Ganges. It is 2525 Km long.

II. Terrestrial habitat

Terrestrial habitats are the ones that are found on land like forest, grassland and desert. It also includes man-made habitats like farms, towns and cities. They can be as big as a continent or as small as an island. They make up about 28% of the entire world habitat.

Example: Evergreen forest, scrub jungles.

Terrestrial habitat is classified into three types. They are:

a. Forest b. Grass land c. Desert

DO YOU KNOW?

The first land plant appeared around 470 million years ago. They were mosses and liverworts.

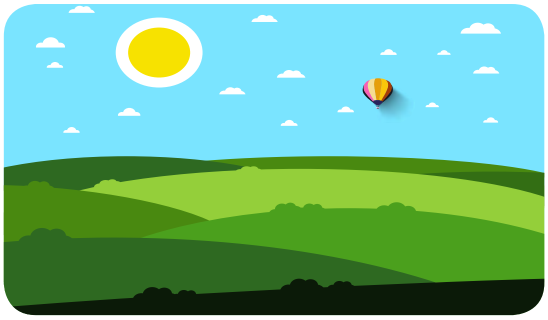
The Amazon Rain Forest in South America produces half of the world's oxygen supply.

a. Forest habitat

Forest is a large area dominated by trees. There are three types of forests. They are: Tropical forests, Temperate forests and Mountain forests. Annual rain fall here ranges from 25 - 200 cm.

b. Grass land habitat

Grassland is an area where the vegetation is dominated by grasses. Grasses range from short to tall. **Example**: Savanna Grassland



c. Desert habitat

A habitat without much water is called deserts. Deserts are the driest place on earth. They get less than 25cm of rainfall annually. Deserts cover atleast 20% of the Earth. The plants which grow in this habitat have thick leaves that store water and minerals. The plants like cactus store water in their stem and the leaves are reduced to spines. They have long roots that go very deep in the soil in search of water. Types of desert habitat include:

(i) Hot dry deserts
(ii) Semi arid deserts
(iii) Coastal deserts
(iv) Cold deserts.

Example: Cactus, Agave, Aloe, Bryophyllum

DO YOU KNOW?

World habitat day is observed on 1st Monday of October every year.

Fact file

Thar Desert, also called Great Indian Desert, is an arid region of rolling sand hills on the Indian subcontinent. It is located partly in Rajasthan state, north-western India, and partly in Punjab and Sindh (Sind) provinces, Eastern Pakistan.

Activity 5

Visit a nearby nursery. Choose any ten varieties of plants and place them under the appropriate habitats.

4.3 Plant Adaptations and Modifications

Adaptations are special features in plants which help them to survive in the habitats they live over a long period. Plants in a specific environment have developed special features which help them to grow and live in that particular habitat. In this section, Let us study about some adaptations like tendrils, twiners and thorns.

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These adaptations are seen in plants which live in terrestrial and desert habitats.

1. **Tendril Climbers**

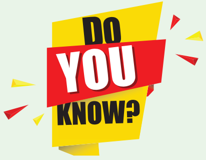
Tendril is a twining climbing organ of some weak stemmed plants like peas and bitter gourd. Tendril coils round a support and helps the plant to climb.

Examples:

a. Sweet Peas (Lathyrus) - Leaflets are modified into tendrils.

b. Bitter Gourd - Axillary buds are modified into tendrils which help the plant to climb.

Lathyrus



Bamboo is one of the fast growing plants, during active growth phase.

2. **Twiners**

Some plants have weak stems. They cannot stand straight on their own. They must climb on any support to survive.

Example: Clitoria and Jasmine

Clitoria sps

3. **Thorns**

Leaves of some plants become wholly or partially modified into sharp pointed structures called 'thorns or spines' for defensive purpose.

Example:

a. Agave - The leaf apex and margins are modified into thorns.

b. Opuntia - The leaves are modified into spines.

c. Bougainvillea – The stem has sharp thorns.

Agave

Opuntia

Activity 6

Field Investigation

Name of the student:

Date :

Location :

Plant types to be observed:

1. A tendril climber
2. A twiner
3. A plant with thorn

Tabulate the modification that you have observed in these plants

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HOTS

Cactus plant is green in colour and performs photosynthesis. Which part of this plant does photosynthesis?

Points to Remember

- The plant body of flowering plant consists of two main parts. They are:
  1. Root system
  2. Shoot system
- Roots fix the plants to the soil. Roots absorb water and minerals from the soil.
- Stem is the ascending part of the plant axis. It has nodes and internodes.
- Leaves perform three major functions such as
  1. Photosynthesis
  2. Respiration
  3. Transpiration
- The surroundings where plants live are called their habitat
- The two major habitats are:
  1. Aquatic habitat
  2. Terrestrial habitat
- Adaptations are special features in plants which help them to survive in their habitat.
- Tendril is a climbing organ of some weak stemmed plants.
- Twiners have weak stem and they can not stand straight on their own.

Evaluation

I. Choose the correct answer.

1. Pond is an example of ___________ ecosystem.
   a) marine b) freshwater
   c) deserts d) mountain
2. The important function of stomata is ___________.
   a) conduction b) transpiration
   c) photosynthesis d) absorption
3. Organ of absorption is ___________
   a) root b) stem
   c) leaf d) flower
4. The habitat of water hyacinth is
   a) aquatic b) terrestrial
   c) desert d) mountain

II. Fill in the blanks.

1. Earth's surface is covered by ___________ % of water.
2. The driest places on the Earth are ___________.
3. Fixation and absorption are the main functions of ___________.
4. Primary organs of photosynthesis are ___________.
5. Taproot system is present in ___________ plants.

III. State True or False. If false, correct the statement.

1. Plants can live without water.
2. All plants have chlorophyll.

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3. Plants have three parts: the root, the stem and leaves.
4. Mountain is an example for freshwater habitat.
5. Root is modified into spines.
6. Green plants need sunlight.

IV. Match the following.

1. Mountain	-	a. Monocot
2. Desert	-	b. Branches
3. Stem	-	c. Dry place
4. Photosynthesis	-	d. Himalayas
5. Fibrous root	-	e. Leaves

V. Arrange the following in correct sequence.

1. Leaf – Stem – Root – Flower
2. Transpiration – Conduction - Absorption – Fixation

VI. Answer very briefly.

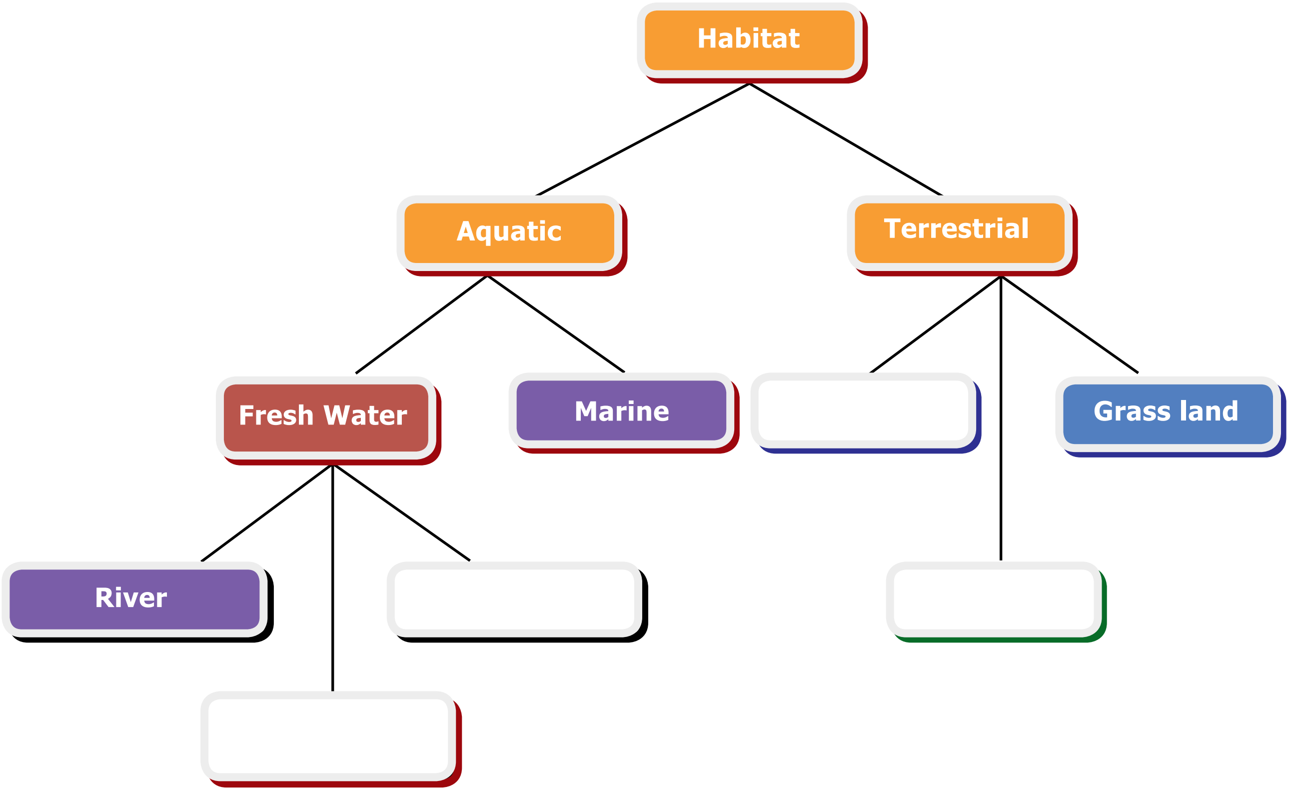
1. Classify the plants on the basis of their habitats.
2. Mention few desert plants.
3. Define the term habitat.
4. Relate the terms leaves and photosynthesis.

VII. Answer briefly.

1. Why do we call jasmine plant, a twiner?
2. Compare the taproot and fibrous root systems.
3. Distinguish between terrestrial and aquatic habitats.
4. List out the plants present in your school garden.

VIII. Answer in detail.

1. Make a list of the functions of root and stem.
2. Complete the map by filling the blanks.



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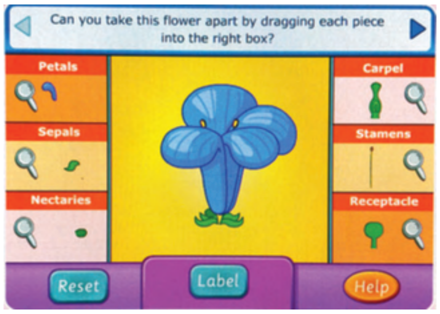
ICT CORNER

Life cycle of plants

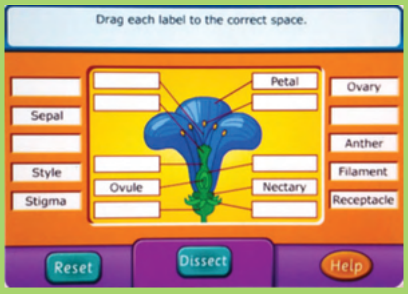
Lets learn parts of the flower.



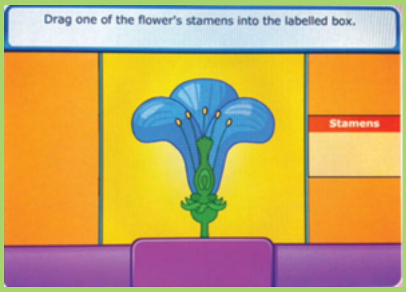
Steps 1: To learn more about the parts of the flower type science kids in the google / browser and select games. Then select life cycle of plants in the screen a flower with its part appear drag one of the flower's stamen into labelled box. Now drag the part of the flower and place it in the labelled box. It's a trial

Steps 2: Instructions will appear on the screen. When click ok next step will appear. Then we have to drag each and every part of the flower into the relevant box.

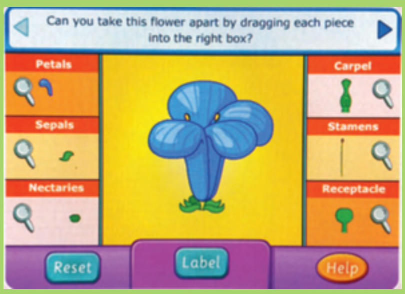
Steps 3: When we click the magnifying glass symbol, uses of the floral parts will appear. Then click ok button. Next an image of flower with its parts appears. It's an evolutionary exercise.



Step1



Step2



Step3

URL:

http://www.sciencekids.co.nz/gamesactivities/lifecycles.html

*Pictures are indicative only

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Unit 5

The World of Animals

Learning Objectives

- To understand that there are many kinds of animals.
- To identify the diversity seen both in plants and animals.
- To distinguish between unicellular and multicellular organisms.
- To identify the variations present in living forms according to their habitat.
- To list out the adaptations exhibited by the animals based on the habitat.
- To explain the relationship present between various living forms.

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Introduction

The National School, Nallur, organised a field trip to a nearby village called Anaikkadu. The students were so happy to see a village with ponds, streams, green fields and coconut trees. With the help of their teacher students were allowed to go around. One of them saw two birds building a nest. Where do the birds build nests and why?

Children saw a number of butterflies fluttering near the flowers. The air was so fresh, so calm, so quiet and so relaxing. They came across a pond in the distance. It had some water. Floating on the water were dark green lotus leaves. A green frog was leaping from one lotus leaf to another making a croaking sound. A girl spotted a rabbit with a short tail.

Can you make a list of the animals seen by the children? Were they all similar? In what way they were similar?

5.1 Biodiversity

In the living world, a lot of diversity is seen both in animals and plants. Every plant and animal is unique. It is called biodiversity. Biodiversity may be defined as the variety and variability among living organisms and the habitats in which they live.

Biodiversity includes a variety of ecosystems such as those that occur in deserts, forests, mountains, lakes, rivers and agricultural fields. In each ecosystem, living creatures, including humans, form a community interacting with one another and with other animals, plants, air, water and soil around them. The living things form biotic community and non-living things form abiotic community.

Habitat

Fishes and crabs live only in water while many animals like elephants, tigers and camels live on land. The geographical features and environmental conditions on earth differ from one place to another. Though camel can live anywhere it is able to live in deserts more comfortably. Polar bear and penguins dwell in cold regions. Living in such harsh conditions requires special features in these animals. They help these organisms to live, breed and excel well in that particular place. Living or dwelling place of an organism is known as **habitat.**

Activity 1

Look at the picture given below and prepare a chart for the following interpretation.

- ❖ How does the climate differ in these habitats?
- ❖ Name some animals that exist in these habitats.
- ❖ Can an animal survive if it is shifted from one habitat to another contrasting habitat?

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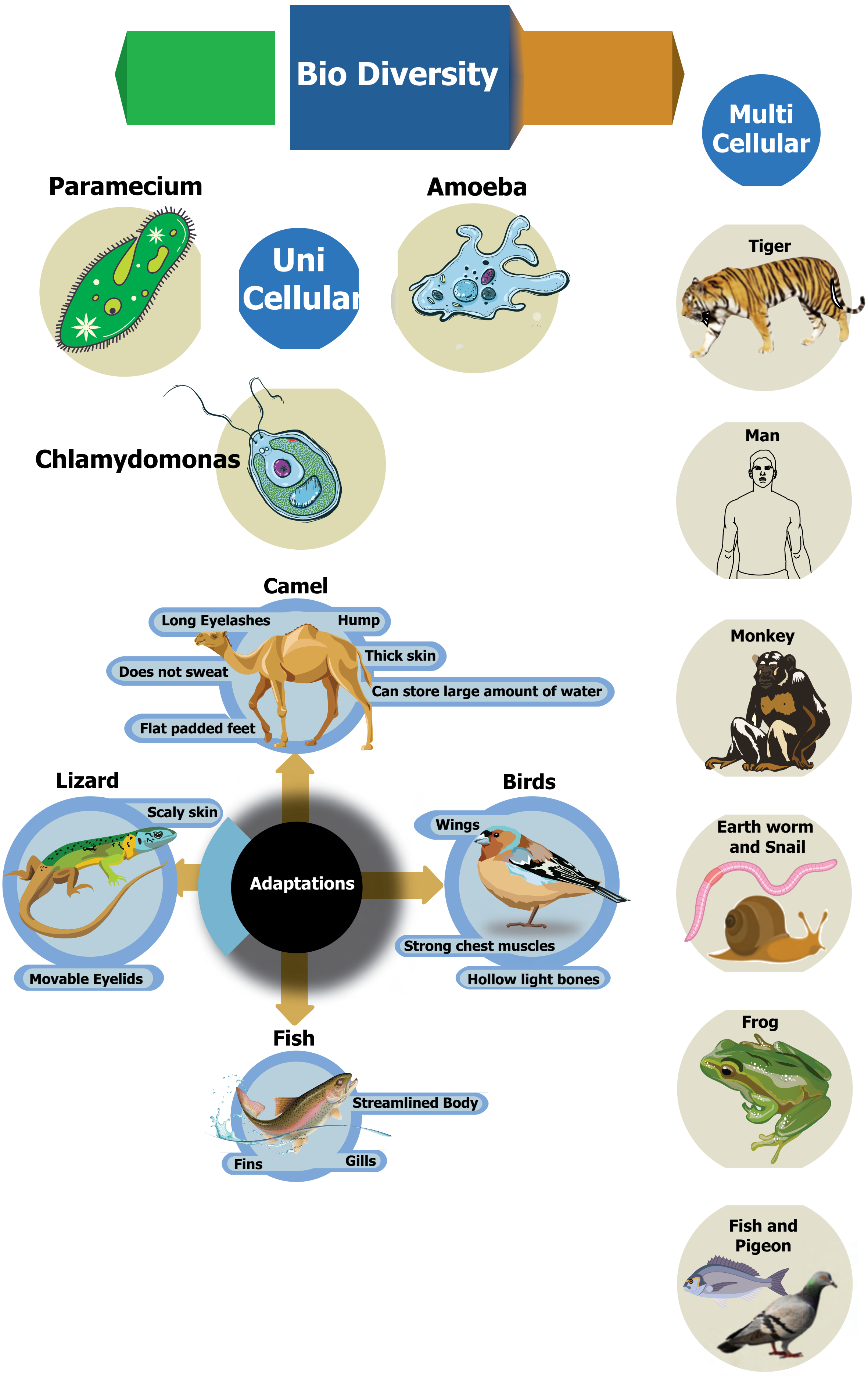

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Activity 2

Collect the pictures of various ecosystems like lakes, ponds, forests, deserts, mountains, and polar regions and prepare a chart of animals living in these places.

DO YOU KNOW?

In **Jurong Birds Park**, Singapore, Penguins are kept in a big glass case with ice bergs and the temperature is maintained at 0° C and below.

Penguin

5.2 Unicellular and Multicellular Organisms

Living things are made of small units called cells. All the functions and processes in the body of living things are brought about with the help of these microscopic cells. Some organisms are made of a single cell and these are called unicellular organisms; whereas, the organisms that are made of many cells are called **multicellular organisms**.

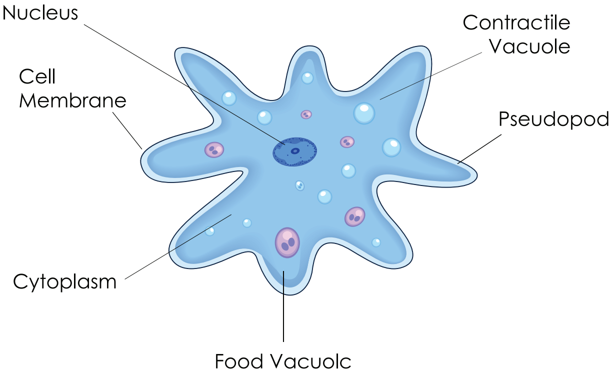
Amoeba, paramecium and euglena are unicellular organisms while fish, frog, lizard, bird and man are multicellular organisms.

1. Unicellular organism

Unicellular organisms are small, usually microscopic. They cannot be seen with naked eye. They are aquatic, simplest and most primitive of all animals. They perform all their physiological activities by the special structures present inside the body called organelles.

Amoeba

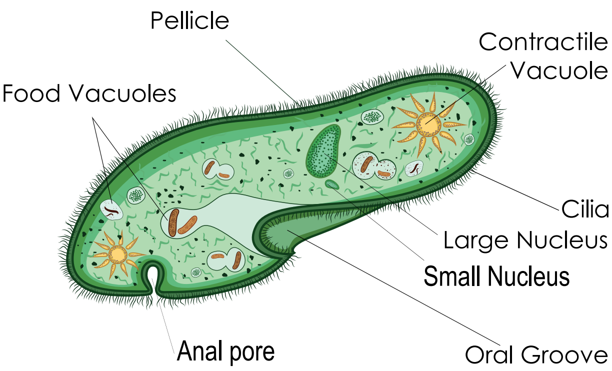
We know Amoeba is an unicellular organism. It does all the activities like digestion, locomotion, respiration and reproduction within the same cell.



It swallows food from the water and the food is digested in the food vacuole. Contractile vacuoles help in excretion. Respiration is by simple diffusion through the body surface. They have finger-like projections called pseudopodia, (false foot) which help in movement or locomotion.

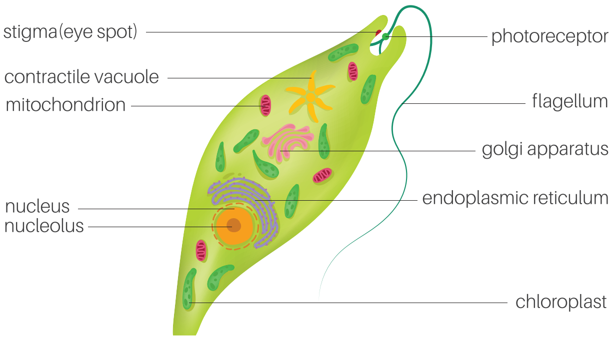
Paramecium

Paramecium is also a unicellular organism which lives in water and moves with the help of cilia.



Euglena

Euglena is an unicellular animal which moves with a flagellum.



2. Multicellular organisms

Majority of organisms we see around us, including animals are multicellular. In such organisms, different functions are carried out by different groups of cells or organs in their body. E.g. Jelly fish, Earth worm, snails, fish, frog, snakes, pigeon, tiger, monkey and man.

Table 1 The differences between Unicellular and Multicellular Organisms.

Unicellular Organism	Multicellular Organism
❖ They are made up of a single cell.	❖ They are organisms that are made up of many cells.
❖ They can perform all the functions of life.	❖ Division of labour exists among cells. Different cells are specialized to perform different functions.
❖ These organisms are generally very small (microscopic) in size.	❖ They are mostly large in size. They are seen through naked eye.
❖ They lack tissues, organs and organ systems.	❖ They are composed of tissues, organs and organ systems.
❖ Growth occurs by an increase in the size of the cells.	❖ Growth occurs by an increase in the number of cells by cell division.
Eg. *Amoeba, Paramecium* and *Euglena*.	Eg. Earthworm, Fish, Frog, Lizard and human being.

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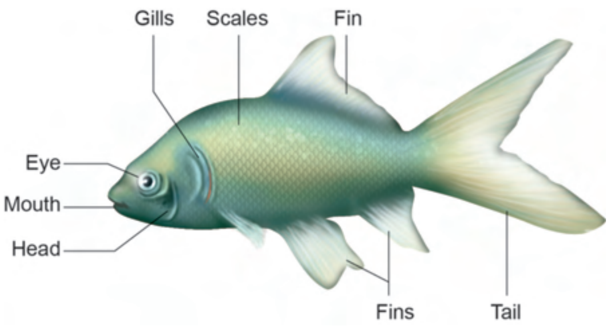
5.3 Adatptation in Animals

A Living thing can survive in a particular habitat if its body is adapted to the conditions of that habitat. Plants and animals develop special characteristics or features in their body in order to survive in their habitat (the surroundings). The presence of specific body features for certain habitats which enable a plant or an animal to live in a particular habitat is called adaptation.

The fish live either in freshwater or in marine water. Let us analyse the adaptations seen in fishes for their aquatic life.

Fish

1. The head, trunk and tail of a fish merge to form a streamlined shape. The streamlined body shape helps the fish to move through the water easily.
2. The fish has special organ called 'gills'. It is a respiratory organ which helps to absorb oxygen dissolved in water for breathing. It is adapted to breathe in water.
3. Most of the fishes have slippery scales all over the body which protect the body.
4. The fish has fins for fast swimming.



5. The fish has strong tail fin which acts as rudder to change direction and keep its body balance in water.

Frog

Amphibians lead a dual mode of life, living both in water and land. They are poikilothermic animals. Their body is divided into head and trunk with two pairs of limbs. During the larval stage, frog respire with the help of gills and the adult frog respire through skin, lungs and bucco-pharyngeal region.

Lizard

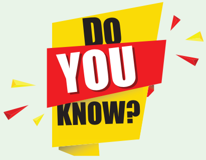
1. Lizards are scaly-skinned reptiles that are usually distinguished from snakes by the possession of legs, movable eyelids, and external ear openings.
2. They mostly inhabit warm regions. Most lizards are quadripedal (walk with four legs) and have a powerful limb.
3. Some lizards are able to run bipedally with two legs. In these lizards, the tail is held out backward and upward and acts as a counterweight.
4. Some lizards have the capacity to rotate the head around the head joint.
5. They breathe through lungs.

6 Most lizards eat a variety of insects like mosquitoes and cockroaches with sharp projections on the tongue adapted for grabbing and holding.

7 Some lizards (Dinosaurs) have web in the toes, and few lizards are able to glide or parachute the air and make safe landings.

Birds

1. They have streamlined body covered with feathers. This body shape provides minimum resistance to air.
2 They have beak instead of mouth.
3. They breathe through lungs.
4. They have a pair of wings that are modified forelimbs.
5. They have hollow and light bones.
6. Usually we see birds fly, however they can also hop, move, run, etc., on the ground and they perch well on the branches of tree with the help of a pair of clawed feet.
7. The tail of the bird helps it to control the direction of the movements.
8. They have strong chest muscles which help them withstand the pressure of the air while flapping their wings during flight.
9. At a time, birds can see one object with one eye and another object with the other eye (Binocular vision).



Animals change their location as the season changes. It is called **migration**. In Tamil Nadu bird sanctuaries are located at **Vedanthangal, Kodiyakkarai** and **Koondhankulam**. Many birds from foreign countries like **Siberia** and **Russia** migrate to Vedanthaangal. Likewise during summer and drought conditions birds from our country migrate to foreign countries. These birds are called **migratory birds**.

Camel

Camel lives in hot desert where water is scarce. Camel is able to survive in desert because of the following special features.

1. The camel has long legs which help it to keep its body away from the hot sand in the desert.
2. A camel can drink large amount of water (when it is available) and store it in the body.
3. A camel's body is adapted to save water in the dry desert in the following ways:
   (i) A Camel passes small amount of urine
   (ii) Its dung is dry and it does not sweat.
   (iii) Since a camel loses very little water from its body, it can live for many days without drinking water.
4. A camel's hump has fat stored in it. In case of energy requirement a camel can break down stored fat for nourishment.

5. A camel has large and flat padded feet which help it to walk easily on soft sand. Thus it is called 'Ship of the desert'.
6. Camel has long eye lashes and hairs to protect its eyes and ears from the blowing dust.
7. It can keep its nostrils closed to avoid dust during sand storms in the deserts.

Info Bits

Spending winters in a dormant condition is called **hibernation** (Winter sleep).
Eg. Turtle
On the other hand, spending the hot and dry period in an inactive state is known as **aestivation** (Summer sleep). Eg. Snail

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DO YOU KNOW?

Kangaroo rat does not drink water at all. It obtains the required water from the seed it eats.

Table: 2 Adaptive features of animals from different habitats

Sl.No.	Name of the Animal	Habitat	Adaptive features
1.	Polar Bear	Polar region	Thick skin for protection, white fur
2.	Penguin	Polar region	Paddle to swim, walk with two legs
3.	Mountain Goat	Mountains	Strong hooves for running Long hair to protect from cold
4.	Lion	Forest	Strong and fast runner has sharp claws to catch prey.

Polar Bear

Mountain Goat

Lion

Penguins

DO YOU KNOW?

The mountain goat namely **Nilgiri Tahr** can find small spaces on rock to climb with ease and keep its balance as it feeds.

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Evaluation

I. Choose the correct answer.

1. The study of living beings or organisms is called

   a. Psychology b. Biology

   c. Zoology d. Botany

2. Which of the following are the characteristics of living beings?

   (i) Respiration (ii) Reproduction

   (iii) Adaptation (iv) Excretion

   Choose the correct one

   a. (i), (ii), and iv only

   b. (i), (ii) only

   c. (ii) and (iv)only

   d. (i), (iv), (ii) and (iii)

3. Lizards breathe through their

   a. skin b. gills

   c. lungs d. trachea

4. All animals need

   a. food and water only

   b. water only

   c. air, food and water

   d. food only

5. Which animal has the special organs of breathing called gills?

   a. Earthworm b. Fox

   c. Fish d. Frog

6. Choose the set that represents only biotic components of a habitat.

   a. Tiger, Deer, Grass, Soil

   b. Rocks, Soil, Plants, Air

   c. Sand, Turtle, Crab, Rocks

   d. Aquatic plant, Fish, Frog, Insects

7. Which of the following cannot be called as a habitat?

   a. A desert with camels

   b. A pond with fish and snails

   c. Cultivated land with grazing cattle

   d. A jungle with wild animals

8. Birds fly in the air with the help of

   a. heavy and strong bones

   b. soft and thick bones

   c. hollow and light bones

   d. flat and thick bones

9. Paramecium moves from one place to other with the help of ____________.

   a. pseudopodia b. flagella

   c. foot d. cilia

10. Kangaroo rat lives in

    a. aquatic habitat

    b. desert habitat

    c. grass land habitat

    d. mountain habitat

II. Fill in the blanks.

1. Water bodies, deserts, mountains are called ______________.

2. Based on the number of cells present animals are classified into ____________ and ____________

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3. Tail of a bird acts as a rudder which helps to ___________

4. Amoeba moves with the help of ___________

III. State True or False. If false, write the correct statement.

1. Habitat is a living or dwelling place of an organism.
2. The geographical features and environmental conditions on earth remain same from one place to other.
3. Amoeba is a unicellular organism and it moves with pseudopodia.
4. Birds can see only one object at a time.
5. Paramecium is a multicelluar organism.

IV. Complete the following.

1. Tropical rain forests, grasslands and deserts are known as ___________
2. Some living things are made of a single cell, called ___________ organism.
3. The breathing organ of a fish is known as ___________
4. The lizard ___________ on the ground with its claw on its feet.
5. Camel stores ___________ in its hump.

V. Answer very briefly.

1. How do birds catch their prey?
2. Where can we see camels in India?
3. Name the locomotory organ of Amoeba.
4. What are the body parts of a snake?
5. Which structure helps the bird to change its direction while flying in air?

VI. Answer briefly.

1. Differentiate between unicellular and multicellular organisms.
2. Write the adaptive features of polar bear and penguin.
3. Mention the features that help a bird to fly is the air?
4. What are the adaptations seen in different types of vertebrates?

VII. Answer in detail.

1. Describe the various features which help camel dwell well in the desert.

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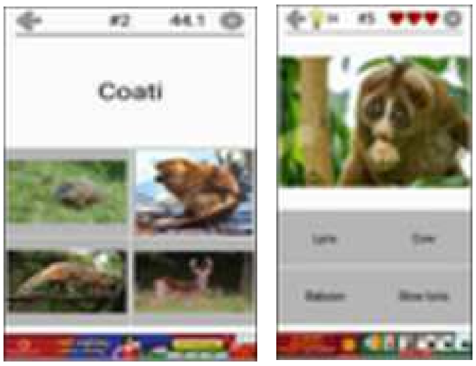
ICT CORNER

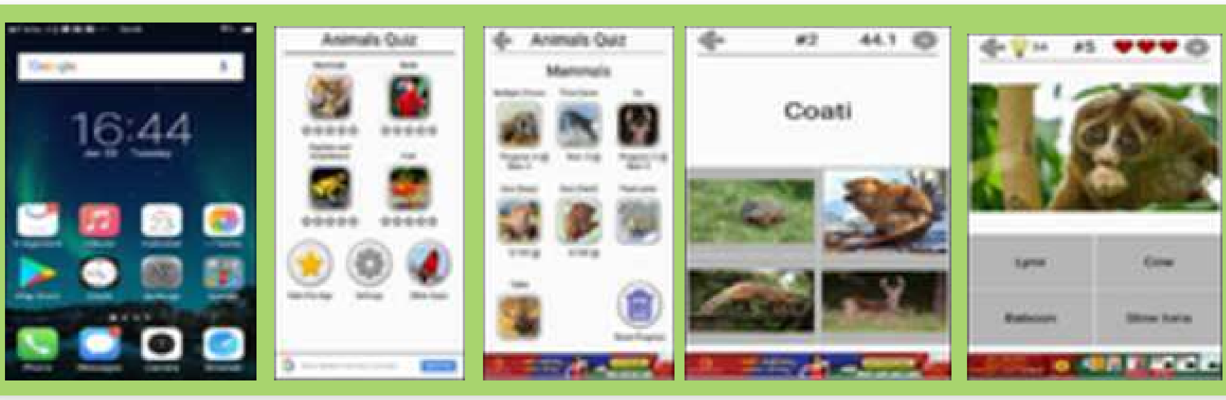
Bio diversity

Lets play animal quiz



Steps:

- Go to Google / browser and type “animal quiz” to know more about the types of animals and their habitation.
- When you get the app, press install button for installing. Then click open and start your game.
- Many options will be displayed on the screen. From that, you select the option of your choice.
- When the choice is selected and the game is started for each animal four options will come. When the correct answer is given it will automatically go to next animal. When the whole episode is over you can go to the starting phase and start the next play.

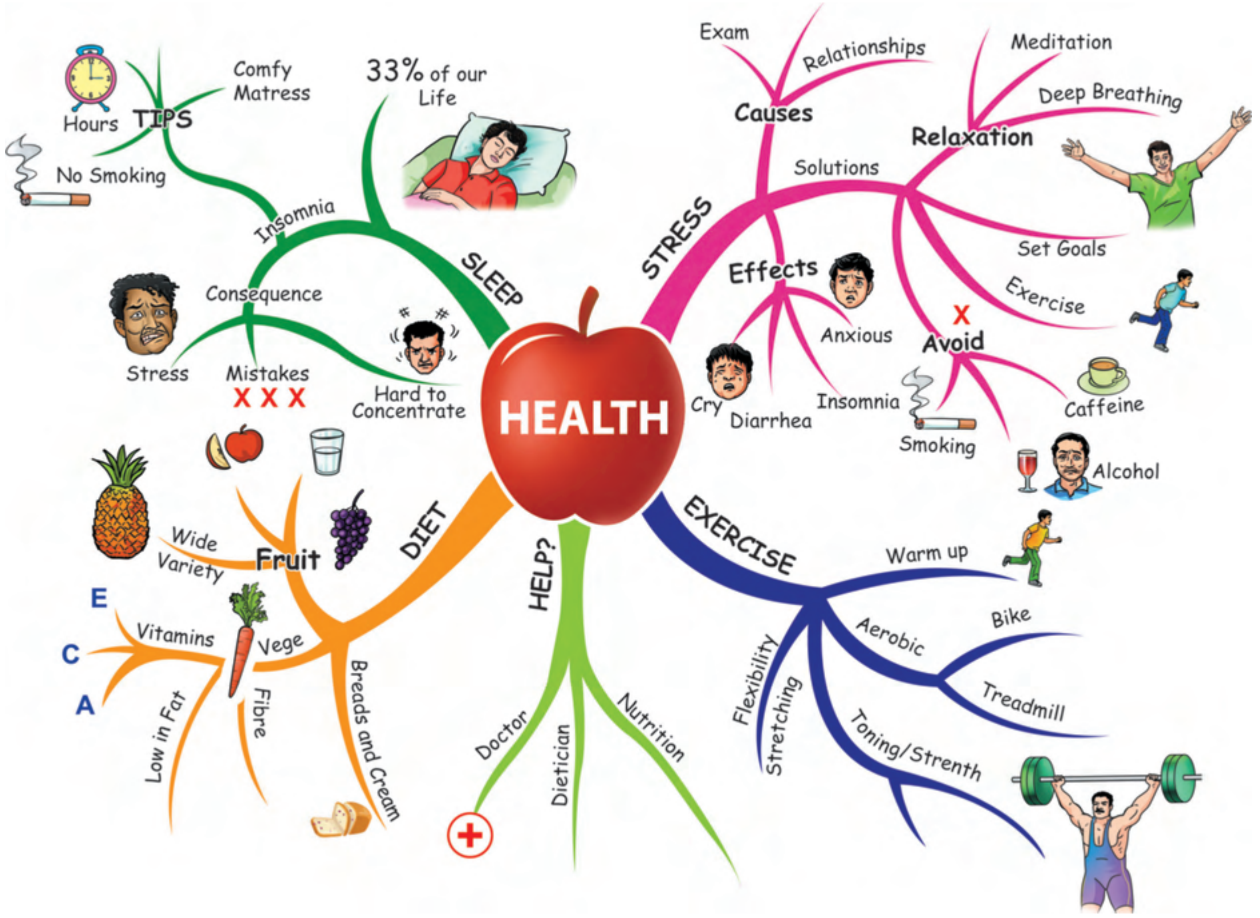


URL:

https://play.google.com/store/apps/details?id=com.asmolgam.animals

*Pictures are indicative only

Unit 6 Health and Hygiene



Learning Objectives

- ❖ To classify the different components of food.
- ❖ To evaluate the importance of nutrients present in food.
- ❖ To know about balanced diet.
- ❖ To list out the deficiency diseases.
- ❖ To describe personal hygiene.
- ❖ To differentiate the diseases caused by bacteria and virus.

Introduction

The word 'health' refers to a state of complete emotional and physical well-being. Healthcare exists to help people maintain this optimal state of health.

As defined by World Health Organization (WHO), 'health is a state of complete physical, mental, and social well being, and not merely the absence of disease or infirmity'. Health is a dynamic condition resulting from a body's constant adjustment and adaptation in response to stresses and changes in the environment for maintaining an inner equilibrium called homeostasis.

Hygiene is a science of establishment and maintenance of health conditions or practices (as of cleanliness) conducive to health. Brushing your teeth regularly is an important part of good oral hygiene. Hygiene is defined as the practice of keeping yourself and your surroundings clean, in order to prevent illness or the spread of diseases.

6.1 Components of Food

Deepa’s family was preparing their monthly provision list.

Provision List

Raw rice	25 Kg
Wheat	5 Kg
Pigeon pea	2 Kg
Green gram	1 Kg
Black gram	2 Kg
Cooking oil	2 lt
Ghee	500 gm

When Deepa saw the list, she had some questions to ask her parents. Why do we eat comparatively more amount of rice and wheat? Why do we consume less amount of oil and ghee? Discuss about the given list with your teacher.

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Activity 1

Identify the following food items and complete the table given below.

Brinjal

Chocolate

Lady's finger

French fries

Ragi

Orange

Guava

Spinach

Moringa Leaves

Gooseberry

Burger

Pearl millet

Food which I like to eat	Food which I don't like to eat	Food which I have never seen before

1. Do your favorite foods make you healthy?
2. Do you choose your food by taste or by its nutritive value?

The chemical constituents of food which give us energy, help to build our body and protect us from diseases are called nutrients. The important nutrients are:

1. Carbohydrate
2. Proteins
3. Fats
4. Vitamins
5. Minerals
6. Water.

Activity 2

Collect as many food items as you can and classify them according to the major nutrient content in them.

Carbohydrates

Carbohydrates are energy giving component of the food.

Table 1 Forms of Carbohydrates

Form of Carbohydrates	Sources
Sugar	Fruits, Honey, Cane Sugar, Beetroot
Starch	Rice, Maize, Potato, etc.
Dietary fibre	Whole grain, nuts,etc.

We can obtain carbohydrates in the form of sugar, starch and dietary fibres.

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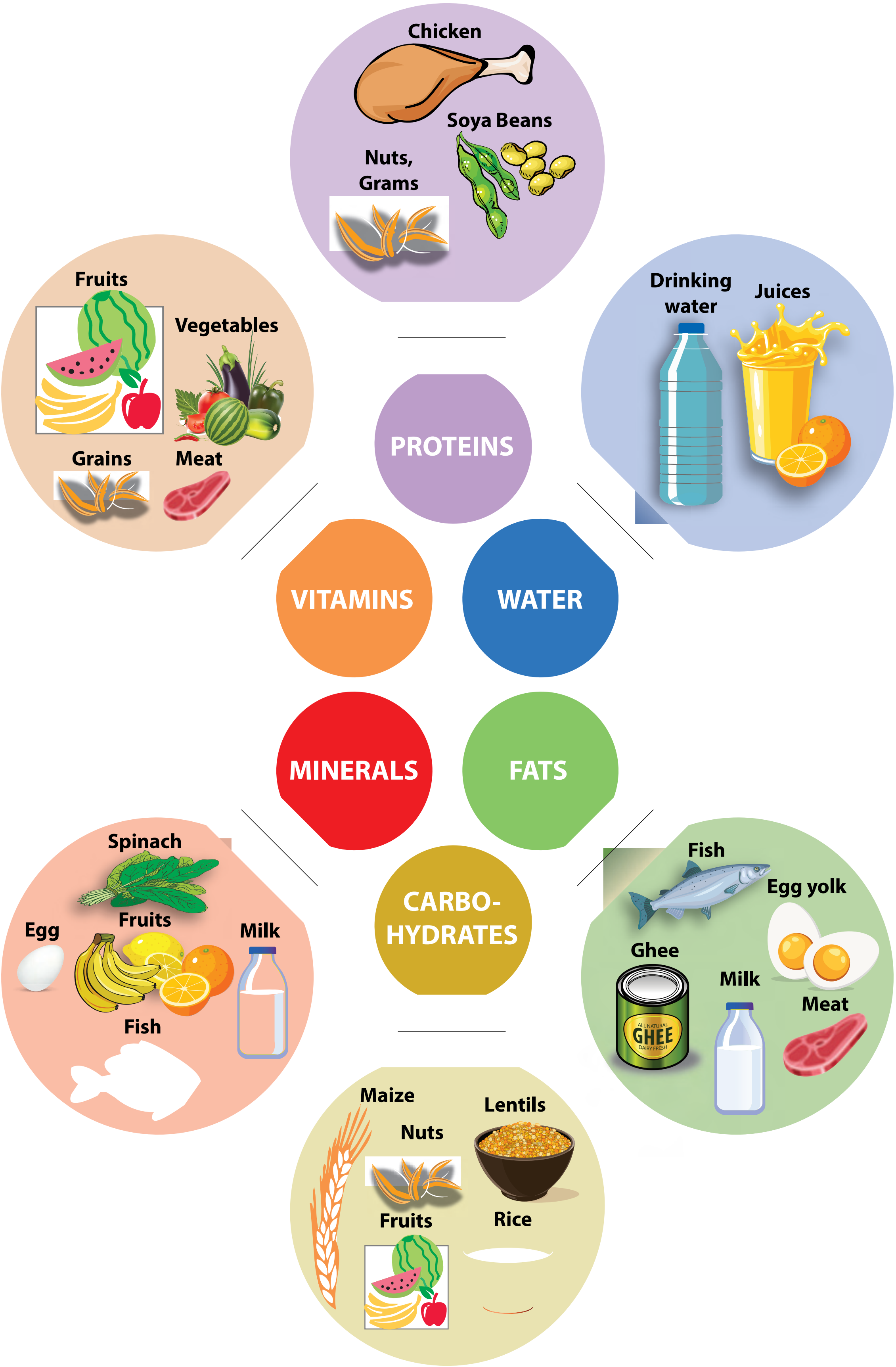
NUTRIENTS



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Activity 3

Aim:

To test the presence of Carbohydrate as Starch in the given food item.

What do you need?

Boiled potato, dropper and dilute Iodine solution

How to do?

Smash the boiled potato.

Add two or three drops of dilute Iodine solution on the sample

What do you observe?

The potato turns blue-black in colour.

What do you infer?

Iodine reacts with starch to form Starch-Iodine complex which is blue-black in colour. Thus, the appearance of blue-black colour confirms the presence of starch in the food item

Whole grains

Fats

Fat is also an energy-giving food and it provides more energy than Carbohydrates. Some important sources of fats are butter, ghee, milk, cheese, paneer, nuts, meat, fish, egg yolk etc. Apart from giving energy, they insulate our body and protect the cells.

Egg yolk

Red meat

Activity 4

Aim:

To test the presence of Fat in the given food item.

What do you need?

Coconut oil, groundnut oil, and any paper.

How to do?

Pour few drops of oil onto the paper and rub it gently with your finger.

In case of ground nut, crush the groundnut and place it on a paper. Now rub the groundnut on the paper.

What do you see?

The paper turns translucent and becomes greasy.

What do you learn?

The given food sample contains fat.

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Protein

Proteins are necessary for our growth as well as for regulating various body functions such as digestion. The sources of proteins are pulses, eggs, fish, milk, chicken, soya bean, nut, grams etc, Proteins are body building foods.

Sprouted pulses

Boiled egg white

Soyabeans

Soyabean is the highly rich source of protein.

Activity 5

Aim:

To test the presence of Protein in the given food item.

What do you need?

Egg white, Copper sulphate solution, Sodium hydroxide, Test tube and Bunsen burner.

How to do?

Take a small amount of the food sample (egg white) and put it in the test tube.

Add some water to the test tube and shake it.

Next, heat the test tube for about one minute. After the test tube is cooled down, add two drops of Copper sulphate solution and Sodium hydroxide solution to it.

What do you see?

The food sample turns purple or violet.

What do you learn?

Change in colour of the given food sample into purple or violet confirms the presence of Protein.

Vitamins

Vitamins are required for carrying out various biochemical reactions in our body. Fruits, vegetables, grains and meat products are good sources of vitamins. Vitamins are called as protective food. There are six major vitamins like A, B, C, D, E and K. Vitamin B and Vitamin C are water soluble. Vitamins A, D, E and K are fat soluble.

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VITAMINS

Types, Functions and Deficiency diseases

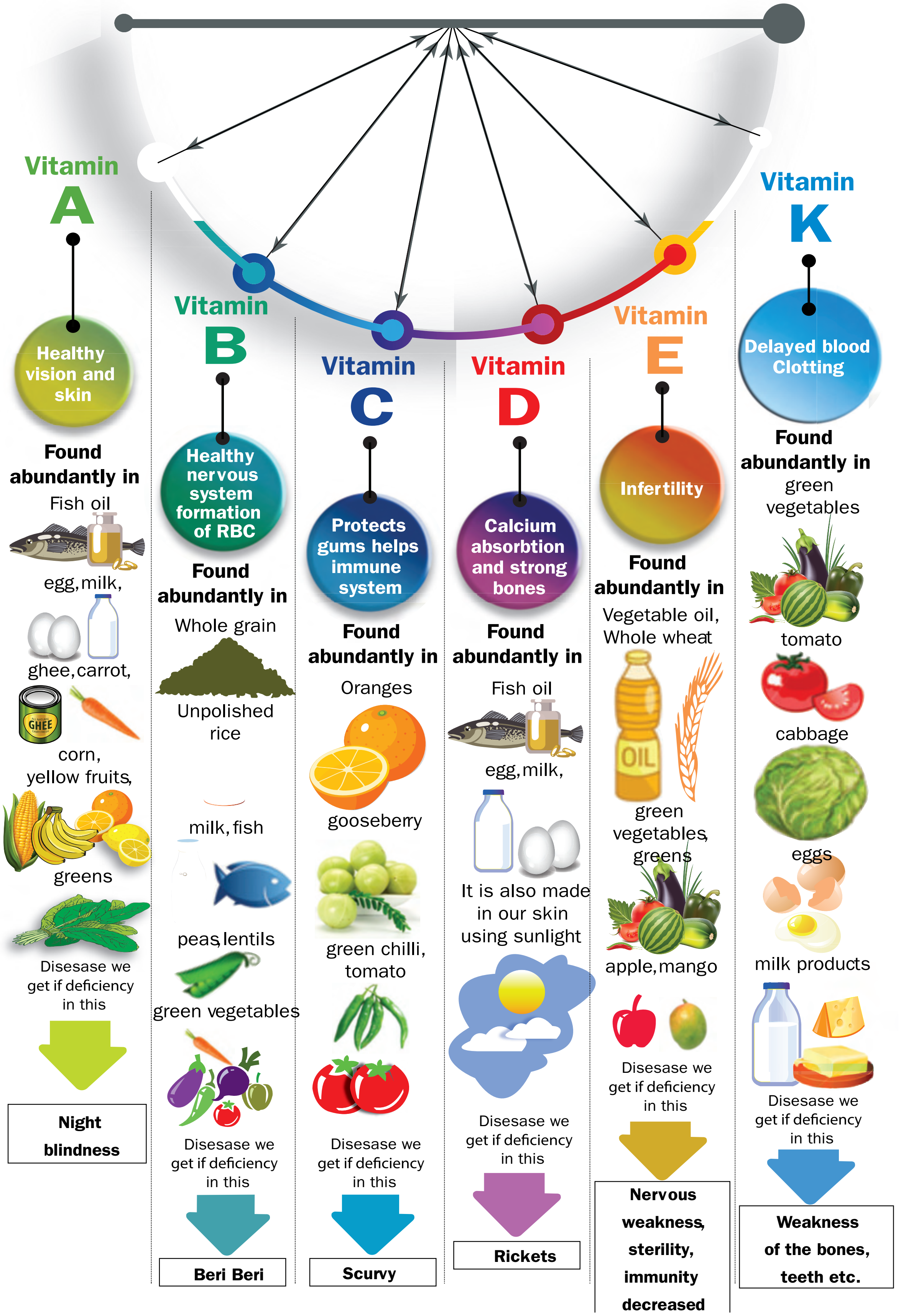

Table 2 Deficiency Diseases

Vitamin	Sources	Disease deficiency	Symptoms
Vitamin A	Fish oil, Egg, Milk, Ghee, Carrot, Corn, Yellow fruits, Greens	Night blindness	Poor vision, difficulty of sight in dim light.
Vitamin B	Whole grain, Unpolished rice, Milk, Fish, Meat, Peas, Lentils Green vegetables	Beriberi	Nerve weakness, Fatigue.
Vitamin C	Oranges, Gooseberry, Green chilly, Tomato	Scurvy	Bleeding gums
Vitamin D	Fish oil, milk and eggs. It is also produced by our skin using sunlight	Rickets	Weak and flexible bones
Vitamin E	Vegetable oils, Green vegetables, Whole wheat, Mango, Apple, Greens	Nerve weakness, Vision deterioration	Sterility, lack of resistance power to illnesses
Vitamin K	Green vegetables, Tomato, Cabbage, Eggs, Milk products.	Weakness of the bones, teeth etc.	Profuse bleeding after a small injury

Gooseberries contains nearly 20 times Vitamin C than Orange.

Just Think

A medical camp was conducted in a school. Most of the children were healthy. Some students had some health issues

Priya had bleeding gums.

Raja could not see clearly in dim light.

Arun had bent legs.

Can you guess what could be the reasons?

Fact File

Sun screen lotion reduces your skin's ability to produce Vitamin D by upto 95% which may lead to Vitamin D deficiency.

Activity 6

Make your food little healthier.
What do you need?

A small cup of green gram seeds, water and thin cloth.

How to do?

Soak the green gram seeds in water over night.

Take out the seeds and strain the water.

Wrap the seeds in wet thin cloth.

Keep it for a day or two.

Sprinkle some water whenever it is dry.

What do you see?

You can see white sprouts coming out of the seeds.

What do you learn?

Green gram sprouts are low in calories, have fibre and Vitamin B. They have comparatively high amount of Vitamin C and Vitamin K.

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Minerals

Minerals are required for growth as well as for the regulation of normal body function. Green leafy vegetables like spinach, pulses, eggs, milk, fish and fruits are important sources of minerals. Minerals are also a protective foods.

Table 3 Minerals and their Functions

Minerals	Functions
Calcium	Strong bones and teeth, Clotting of blood
Phosphorus	Strong bones and teeth
Iodine	Synthesis of thyroid hormone
Iron	Formation of haemoglobin and brain development

DO YOU KNOW?

80% of the Moringa leaves in the world are produced in India. The major countries which import Moringa leaves are China, US, Germany, Canada, South Korea and European countries.

Fact File

Moringa leaves are rich in
Vitamin A
Vitamin C
Potassium
Calcium
Iron and
Protein.
They also contains powerful anti-oxidants

Water

Our body needs an adequate supply of water in order to maintain good health. Any human being should take minimum eight tumblers (2 Litres) of water every day.

Activity 7

Complete the following table

S.No.	Nutrients	Sources	Functions
1	Carbohydrates	Rice,Wheat,Potato	
2	Fats		Give us energy
3	Proteins		
4	Vitamins	Fruits, Vegetables, Grains, Meat and Dairy products	
5	Minerals		Regulation of growth and normal body function

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6.2 Health and Nutrients

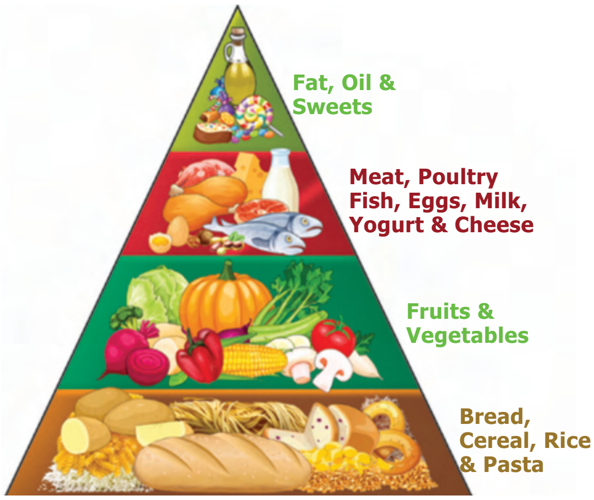
Look at the pictures given below. Mark ✓ for healthy persons and mark ✗ for unhealthy persons.

Health is a state of complete physical, mental and social well-being and not merely absence of diseases. Eating a healthy diet keeps you physically and mentally fit. When you are physically healthy, you feel confident, you are more outgoing and have a greater capacity for enjoying life.

Unhealthy food choices lead to obesity and illness, preventing you from socializing with friends and family. So choose your diet carefully.

Balanced Diet

A diet should contain adequate amount of all the necessary nutrients required for healthy growth and activity.



Food Pyramid

A balanced diet contains sufficient amount of various nutrients to ensure good health. Balanced diet is important for the following reasons.

- It increases the capacity to work.
- It gives good physical and mental health.
- It increases the capacity to resist diseases.
- It helps in proper growth of the body.

Activity 7

Prepare a diet chart to provide balanced diet to a 12 year old boy/girl. The diet chart should include food item which are not expensive and are commonly available in your area.

Malnutrition

When your diet is not balanced, what would be the consequence? Observe the below picture carefully.

- Do these children look normal?
- Guess, what would be the reason.

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Kwashiorkar

Marasmus

These children do not have normal health because of malnutrition.

Malnutrition occurs when all the nutrients that the body needs are not obtained in the proper proportions from the diet. The word malnutrition refers to the condition that results when a person does not take a balanced diet. Malnutrition leads to deficiency diseases. The diseases that are caused due to lack of nutrients in the diet are called deficiency diseases.

DO YOU KNOW?

India has the second largest number of obese children in the world after China. According to a study it has been found that 14.4 million children in the country have excess weight.

Table 5 Protein deficiency diseases

Deficiency Diseases	Symptoms
Kwashiorkar	Stunted growth, Swelling of face, limbs and belly, Diarrhoea.
Marasmus	Skinny appearance, Slow body growth.

Table 6 Mineral deficiency diseases

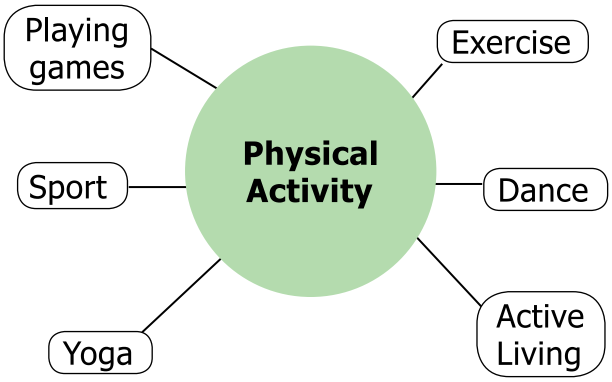
Mineral	Deficiency Disease
Calcium	Rickets
Phosphorus	Osteomalatia
Iodine	Cretinism (in child) Goitre (in adult)
Iron	Anaemia

Activity 8

Visit a nearby Anganwadi centre and find the steps taken by the government to overcome malnutrition and ensure health in the age group 0-5 years.

Physical Exercise

Physical exercise is any bodily activity that enhances or maintains physical fitness and overall health and wellness.



Physical activity is important for many reasons, including:

- increasing growth and development.
- strengthening muscles and the cardiovascular system.

- developing athletic skills, weight loss or maintenance, and enjoyment.

Physical exercise may help to decrease some of the effects of childhood and adult obesity.

Rest

Proper amount of rest is essential for physical and mental health. Rest is as important as nutrition and physical activity for growth and development and good health.

Discuss with Friends

" Early to bed and early to rise make a man healthy, wealthy and wise"

Benjamin Franklin

Personal Cleanliness

Hygiene is a set of practices performed to preserve health. According to the World Health Organization (WHO), "hygiene refers to conditions and practices that help to maintain health and prevent the spread of diseases".

Personal hygiene involves those practices performed by an individual to care for one's bodily health and well being, through cleanliness. It includes such personal habit choices as how frequently we bathe, wash hands, trim fingernails, and change clothing. It also includes attention to keep surfaces in the home and workplace, including bathroom facilities, clean and pathogen-free.

Activity 9

One day Rahim, a class six boy vomited three times. He was looking tired and dehydrated. His mother who is working as a nurse prepared a solution and gave it to him to drink. He felt better after sometime and asked his mother what the solution was. His mother told that it is Oral Rehydration Solution (ORS). Shall we know what an ORS is?

Vomiting or loose motions result in loss of water and cause salt imbalance in the body. Loss of water (dehydration) can lead to serious problems. This can be prevented by consuming ORS at short intervals.

Follow the steps to make ORS at home.

- Take a litre of boiled water and cool it.
- Add half a teaspoon of salt and six teaspoons of sugar to it.
- You can also add a few drops of lemon juice to it. Stir it and give it to the person suffering from vomiting, loose motion or dehydration.

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Table 6 Personal Hygiene and Frequency of Cleanliness

Components	Recommended frequency of cleaning
Eye hygiene	Every morning and whenever the face is dirty.
Hair hygiene	Weekly twice preferably once in every other day.
Body hygiene	Once or twice a day.
Oral hygiene	Brushing twice a day. Rinsing after each meal.
Feet hygiene	Every day
Hand hygiene	Every time after touching contaminated surfaces. Every time before eating and touching clean surfaces.
Clothe hygiene	Once or twice a day.

6.3 Introduction to Microbes

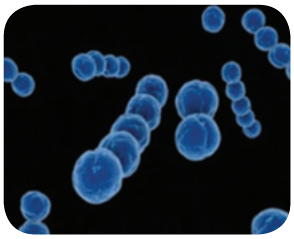
When you neglect personal hygiene, you are increasing the risk of falling sick. Let us name some of the diseases or conditions caused by microorganism due to the negligence of personal hygiene.

1. Diarrhoea
2. Tooth decay
3. Athlete's foot (Madurai's foot)
4. Dandruff.

Do you believe that there are some organisms which you cannot see with your naked eye? Yes. microbes can not be seen without the help of a microscope.

Most of the microbes belong to four major groups.

- Bacteria
- Virus
- Protozoa
- fungi



Bacteria

Bacteria are very small prokaryotic microorganisms. Bacterial cells do not have nucleus and do not usually have membrane bound organelles.

- Bacteria can exist either as independent organisms or as parasites.
- They invade tissues.
- They produce pus or harmful wastes.

DO YOU KNOW?

Disease

Disease is a definite pathological process having a characteristic set of signs and symptoms.

Disorder

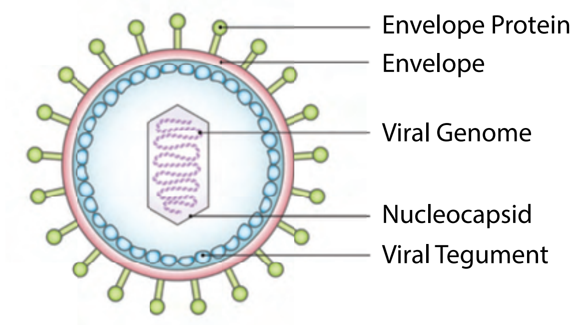
Disorder is a derangement or abnormality in function.

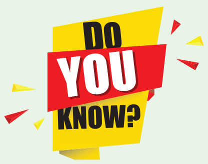
Table 7 Bacterial Diseases

S.No	Bacterial diseases	Mode of transmission
1	Cholera	Contaminated water
2	Pneumonia	Inhalation of airborne droplets from a sneeze or cough.
3	Tetanus	Contamination of wounds with the bacteria.
4	Tuberculosis	Inhalation of airborne droplets from a sneeze or cough.
5	Typhoid	Contaminated food or water

Virus

Virus is an infective agent that typically consist of nucleic acid molecule in a protein coat. It replicates only inside the cells of other living organisms. Virus can infect all types of life forms like plant, animals and microorganisms. They invade living normal cells and use their cell machinery to multiply. They can kill, damage or change the cells and make you sick.





A Virus that contains R.N.A. instead of D.N.A. is called a Retrovirus

Diseases caused by Virus

1. Common cold
2. Influenza
3. Hepatitis
4. Polio
5. Smallpox
6. Chicken pox
7. Measles

Discuss in your classroom

Is virus a living thing or non living thing?

Suggested project

Get a vaccination schedule from a nearby doctor or a hospital. From the list, identify the bacterial diseases and the viral diseases for which vaccination is given.

Points to Remember

- There are six nutrients. They are: Carbohydrate, Fats, Protein, Vitamins, Minerals and Water
- Kwashiorkor and Marasmus are protein deficiency diseases.
- Night blindness, scurvy, rickets and beriberi are vitamin deficiency diseases.
- Bacteria is a prokaryotic microorganism.
- Cholera, typhoid and pneumonia are bacterial diseases.
- Influenza, common cold and chicken pox are viral diseases.

Evaluation

I. Choose the correct answer.

1. Our body needs ______ for muscle building.
   a) carbohydrate b) fat
   c) protein d) water

2. Scurvy is caused due to the deficiency of________.
   a) Vitamin A b) Vitamin B
   c) Vitamin C d) Vitamin D

3. Calcium is an example for
   a) carbohydrate b) fat
   c) protein d) minerals

4. Bacteria are very small _______ microorganism.
   a) prokaryotic b) eukaryotic
   c) protozoa d) acellular

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5. We should include fruits and vegetables in our diet, because_______.
   a) they are the best source of carbohydrates
   b) they are the best source of proteins
   c) they are rich in minerals and Vitamins
   d) they have high water content

II. State True or False. If false, write the correct statement.

1. There are three main nutrients present in food.
2. Fats are stored as energy by our body.
3. All bacteria have flagella.
4. Iron helps in the formation of haemoglobin.
5. Virus can grow and multiply outside host.

III. Fill in the blanks.

1. Malnutrition leads to __________.
2. Iodine deficiency leads to ______ in adults.
3. Vitamin D deficiency causes _______.
4. Typhoid is transmitted due to contamination of _____ and water.
5. Influenza is a ___________ disease.

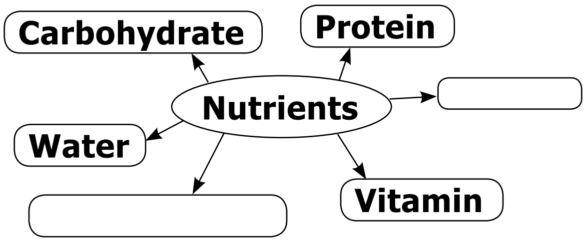
IV. Complete the analogy.

1. Rice : Carbohydrate :: Pulses :_____.
2. Vitamin D : Rickets :: Vitamin C : _____.
3. Iodine : Goitre :: Iron : _____.
4. Cholera : Bacteria :: Smallpox : ______

V. Match the following.

1.	Vitamin A	a. Rickets
2.	Vitamin B	b. Night blindness
3.	Vitamin C	c. Sterility
4.	Vitamin D	d. Beri beri
5.	Vitamin E	e. Scurvy

VI. Complete the diagram.



VII. Answer very briefly.

1. Write two examples for each of the following.
   a) Food items rich in fat.
   b) Vitamin deficiency diseases.
2. Differentiate between carbohydrate and protein.
3. Define balanced diet.
4. Why should fruits and vegetables not be washed after cutting?
5. Mention any two viral diseases.
6. What are the main features of a microorganism?

VIII. Answer in details.

1. Tabulate the vitamins and their corresponding deficiency diseases.

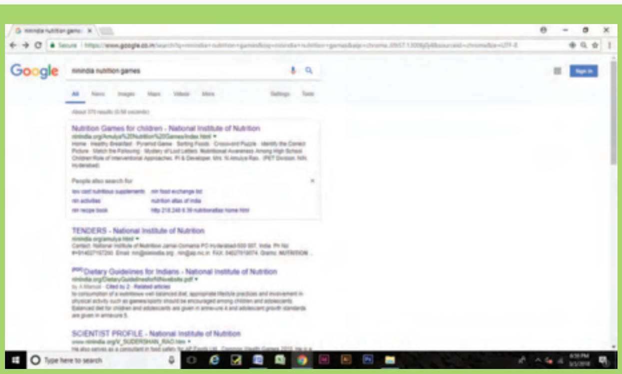
ICT CORNER

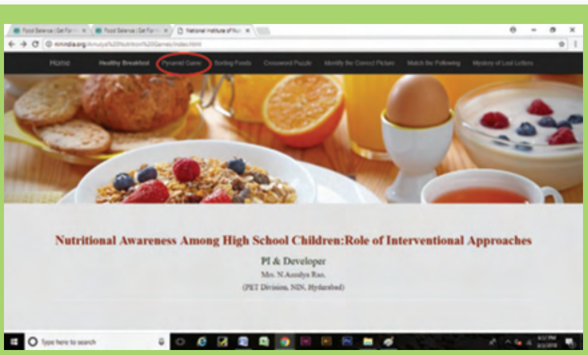
Balanced food

Play with pyramid game

Steps:

- To learn and know more about balanced food, Go to google or browser and type ninindia nutrition games
- When the homepage opens click pyramid game
- drag and drop the each foodmitem in the pyramid.





URL:

http://ninindia.org/Amulya%20Nutrition%20Games/index.html

*Pictures are indicative only

Unit 7 Computer - An Introduction

Learning Objectives

- To know about computers.
- To know about the history of computers.
- To understand the growth and development of computers.
- To understand the generations of computers.
- To understand the types of computers.
- To apply the knowledge of computer in various fields in our day to day life.

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(Boys and girls of standard VI are playing in the playground).

Siva: Hey Salim, I saw your father coming with a big parcel yesterday. I guess you could have bought a new television. Am I right?

Salim: It's not a television Siva. We bought a new computer.

Malar: Oh, I see. computer! I had seen it used in textile shop for billing.

Selvi: Malar, not only it is used in textile shops, but also in railway stations, banks, ATM's and in many places. It is used even in our local post offices.

Nancy: Hey! I have seen it in my school.

Salim: Is it only in your school? Nancy, I think your father is also having a computer.

Nancy: Is my father having a computer?! Without my knowledge? I am sure that my father does not have computer. He has only a mobile phone.

Salim: That's what I say. Your father's mobile phone is also like a computer.

Nancy: Oh no Salim? What do you mean? How can a mobile phone be compared with a computer?

Salim: Nancy, we usually think that computer should be like a big TV and a box attached with it. But computers are available in different shapes. The works which are done with a computer can also be done using a smart phone. There may be difference in their speed, but their operations remain the same. The big computers are shrunk into small smart phones nowadays because of the technological development. Most of us think that smart phones are only to make calls because of its handy look But it is not so.

Selvi: What about laptops and tablets? Are they same like the computers we usually think of?

Salim: Yes, they are all the same. There are different types of computers. But their performance vary according to their capacity.

Siva: That's ok Salim, why do you need a computer in your home? What will you do in that?

Salim: I can use it to draw, paint, play games and I can learn and develop my general knowledge.

Selvi: Salim, you know more about computers!

Salim: I know very little about computers. As my father uses computer in his office, he knows much about it. I shared very little of what I have learnt from my father.

(All the children stood up when the teacher came and stood near them)

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Teacher: What is going on?

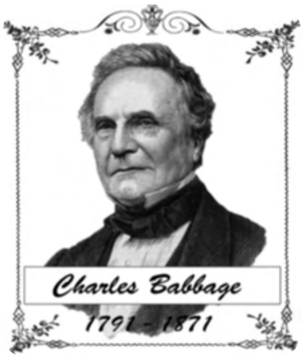
Children: We are discussing about the computer sir.

Teacher: Oh, I see, that's nice. I will explain about computers in detail. Firstly I will explain you, what is a computer? Computer is an electronic device that processes the data and Information according to our needs. We can save the data and convert it into information. Computers are used in many ways.

Malar: We are eager to know who invented the computer.

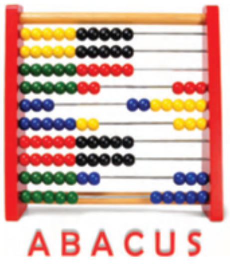
Teacher: In the beginning of the 19th century, Charles Babbage, a professor in Mathematics designed an analogue computer. He is known as the father of computer.

The basic structure designed by him is being used in all computers. Similarly, Augusta Ada Lovelace is admired as the first programmer as she developed essential commands for the mathematical operations.



Nancy: Sir, can you tell us which device was used before the invention of computer?

Teacher: In the early stage, there was no computer. Initially the people used a tool called abacus for calculations.



Later, they started using a device called calculator for calculation.

Selvi: Wow! It's really interesting sir. Then, when did computers come into use Sir?

Teacher: Good question Selvi. Computer didn't come directly from abacus. The computers that we use today belongs to fifth generation.

Nancy: Oh! Were there four more generations previous to this?

Teacher: Yes Nancy, you are correct.

Siva: Sir! Can you explain us about the five generations?

Teacher: Sure, I can explain.

- In the First generation computers, Vacuum tube was used.
- In the Second generation computers, they used Transistor.
- In the Third generation computers, they used Integrated Circuits.
- In the Fourth generation computers, they used Micro processor.
- In the Fifth generation computers Artificial Intelligence is used.

Selvi: Sir, we are eager to know more about the present computers which we use.

Teacher: Data and information are the two important elements in computers.

Malar: Sir, what is meant by data?

Teacher: Data is the information that has to be processed. It cannot be used

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Generations of Computer

1940-1956 Vacuum tubes | 1956-1963 Transistor | 1964-1971 Integrated Circuit | 1971-2k Micro Processor | 2001-Now Artificial Intelligence

directly by us. Generally, they are in the form of numbers, alphabet and images.

Siva: Sir... then what is information?

Teacher: Information is a form of processed data.

Siva: What is software and hardware, Sir?

Teacher: The commands or programs that are used in computer are called software. This software can be divided into two types.

1. Operating software
2. Application software.

Nancy: What is Operating Software?

Teacher: Software that is used to operate the computer is called operating software. I think you are familiar with Windows and Linux

Siva: Then, what is application software?

Teacher: Application software is a software that is used to run a particular program. For example, the software used for painting, playing games in computer.

Nancy: Oh! I have learnt much information about computers today sir!.

Malar: Ok Sir, then what is hardware?

Teacher: The parts that are available in the computer that helps the software to work is a hardware.

Salim: Sir, please tell us more about it

Teacher: Yes, sure I will. Whatever we want to send to a computer is sent through a device called input device. For example, the keyboard, mouse and other input devices.

The data or information that has been sent to the computer are displayed out or reproduced through some devices. These are called as output devices. For example, printer, monitor and so on.

Nancy: Ok Sir, then what is CPU?

Teacher: It is the central processing unit. You will learn and understand more about CPU in your higher classes.

All Children together: Thank you so much, sir. Today we have learnt and understood more information about computers.

DO YOU KNOW?

ENIAC (Electronic Numerical Integrator and Computer) was the first Computer introduced in the year 1946. This is the first General purpose computer.

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Evaluation

BA7V4

I. Choose the correct answer.

1. Who is the father of computer?
   a. Martin Luther King
   b. Graham Bell
   c. Charlie Chaplin
   d. Charles Babbage

2. Which of the following is another form of computer?
   a. Blackboard b. Mobile
   c. Radio d. Book

3. When was the first computer introduced?
   a. 1980 b. 1947
   c. 1946 d. 1985

4. Who is the computer's first programmer?
   a. Lady Wellington
   b. Augusta ado Lovelace
   c. Mary Curie
   d. Mary Comb

5. Pick out the odd one.
   a. Calculator b. Abacus
   c. Flash card d. Laptop

II. Fill in the blanks.

1. Data is _______________ information.
2. World's first general purpose computer is _______________
3. Information is _______________ data.
4. Fifth generation computer has _______________ intelligence
5. _______________ is the device that uses Index number.

III. State True or False.

1. Computer is an electronic device.
2. Sir Isaac Newton invented computer.
3. Computer can do calculations fast.

IV. Match the following.

First generation computer	-	Artificial Intelligence
Second generation computer	-	Integrated Circuit
Third generation computer	-	Vacuum tubes
Fourth generation computer	-	Transistor
Fifth generation computer	-	Micro processor

V. Answer briefly.

1. What is a computer?
2. Who are the pioneers / forerunners of computer?
3. Write a short note on Data.
4. Name any four input devices.
5. Differentiate hardware and software.

VI. Answer in detail.

1. Explain in detail above the applications of computer.

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A-Z GLOSSARY

1.	Abacus (அபாகஸ்)	-	மணிச் சட்டம்
2.	Computer (கம்ப்யூட்டர்)	-	கணினி
3.	Architecture	-	கட்டமைப்பு, வடிவமைப்பு
4.	Command	-	கட்டளை
5.	Calculator	-	கணிப்பான், கணக்கிடும் கருவி
6.	Cell Phone, Mobile (செல்போன்)	-	கைபேசி, அலைபேசி
7.	Tablet (டேப்லட்)	-	கைக்கணினி, வரைப்பட்டிகை
8.	Data	-	தரவு, முறைப்படுத்தபட வேண்டிய விவரங்கள்
9.	Information	-	தகவல், முறைப்படுத்தப்பட்ட விவரங்கள்
10.	Electronic Machine	-	மின்னணு இயந்திரம், மின்சாரத்தால் இயங்கும் இயந்திரம்
11.	Analog computer (அனலாக் கம்ப்யூட்டர்)	-	குறியீட்டு எண்களைப் பயன்படுத்தி கணக்கிடும் கருவி
12.	Smart phone (ஸ்மார்ட் போன்)	-	திறன் பேசி
13.	Post Office	-	தபால் நிலையம்
14.	Automated Teller Machine (ATM)	-	தானியங்கி பண எந்திரம்
15.	Keyboard	-	விசைப்பலகை
16.	Software	-	மென்பொருள்
17.	Hardware	-	வன்பொருள்
18.	Printer	-	அச்சுப் பொறி
19.	Mouse	-	சுட்டி
20.	Program	-	நிரல்
21.	Programmer	-	நிரலர்

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Scientific Terms

1. Measuring Tape - அளவு நாடா
2. Stop clock - நிறுத்துக் கடிகாரம்
3. Measuring jar - அளவுசாடி
4. Unit - அலகு
5. Parallax error - இடமாறு தோற்றப்பிழை
6. Mass - நிறை
7. Weight - எடை
8. Animate factors - உயிருள்ள காரணிகள்
9. Inanimate factors - உயிரற்ற காரணிகள்
10. Contact forces - தொடு விசைகள்
11. Non-contact forces - தொடா விசைகள்
12. Linear motion - நேர்கோட்டு இயக்கம்
13. Curvilinear motion - வளைவுப்பாதை இயக்கம்
14. Circular motion - வட்டப்பாதை இயக்கம்
15. Rotatory motion - சுழற்சி இயக்கம்
16. Oscillatory motion Zigzag (Irregular) - அலைவு இயக்கம்
17. motion - ஒழுங்கற்ற இயக்கம்
18. Average speed - சராசரி வேகம்
19. Periodic motion - கால ஒழுங்கு இயக்கம்
20. Non-periodic motion - கால ஒழுங்கற்ற இயக்கம்
21. Uniform motion - சீரான இயக்கம்
22. Non-uniform motion - சீரற்ற இயக்கம்
23. Artificial Intelligence - செயற்கை நுண்ணறிவு
24. Nano robotics - நானோ எந்திரனியல்
25. Diffusion - விரவுதல், பரவுதல்
26. Liquefaction - நீர்மாக்கல்
27. Compressible - அழுத்தப்படக்கூடிய
28. Unadulterated - கலப்படமற்ற
29. Components - பகுதிப்பொருட்கள்
30. Proportion - விகிதம்
31. Extraction - பிரித்தெடுத்தல்
32. Strainer - வடிகட்டி
33. Churning - கடைதல்
34. Threshing - கதிரடித்தல்
35. Winnowing - தூற்றுதல்
36. Sedimentation - படியவைத்தல்
37. Decantation - தெளியவைத்து இறுத்தல்
38. Filtrate - வடிநீர்
39. Reaction - வினை
40. Dissolution - கரைத்தல்
41. Sublimation - பதங்கமாதல்
42. Melting - உருகுதல்
43. Vaporization - ஆவியாக்குதல்
44. Condensation - ஆவி சுருங்கல்
45. Freezing - உறைதல்
46. Terminal bud - நுனி மொட்டு
47. Auxiliary buds - கோண மொட்டு
48. Nodes - இலைக் கணு
49. Tendril - பற்றுக்கம்பி
50. Twiners - தழுவுகொடி
51. Thorns - முள்
52. Adaptation - தகவமைப்பு
53. Bio diversity - பல்லுயிர் தன்மை
54. Eco system - சூழியல் மண்டலம்
55. Migration - இடம்பெயர்வு
56. Abiotic community - உயிருள்ள சமூகம்
57. Biotic community - உயிரைச் சார்ந்த சமூகம்
58. Malnutrition - ஊட்டச்சத்துக் குறைவு
59. Deficiency diseases - குறைபாட்டு நோய்கள்
60. Hygiene - சுகாதாரம்
61. Personal Hygiene - தன் சுத்தம்

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SOCIAL SCIENCE

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ZNYP5

QR Code

Given to make content more interesting and dynamic in nature to enhance the thinking skills.

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E - Book

STOUO

Assessment

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HISTORY

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Unit 1

What is History?

Learning Objectives

- To know what history is all about
- To understand the importance of history
- To learn about the lifestyle of the pre-historic man
- To know how paintings portray the daily activities of the pre-historic man
- To understand the importance of history and historical researches

Tamilini enters her house from school. Her mother, who was reading a book, greets Tamilini with a hug. She collects her school bag and asks Tamilini to refresh herself. She gives Tamilini some snacks to eat. She then asks Tamilini about the school activities of that day.

Mother: Tamilini, what subject did you study today?

Tamilini: History, ma.

Mother: Oh nice! Did you properly understand what history is?

Tamilini: Yeah! I understood something about history. Can you please tell me more about history?

Info Bits

Telling the Time in History

Time in history is calculated in years using BC (BCE) Before Christ (Before Common Era) and AD(CE) Anno Domini (Common Era).

2500 2000 1500 1000 500 0 500 1000 1500 2000 2500

BC (BCE) **AD (CE)**

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DO YOU KNOW?

History is the study of past events in chronological order.

Mother : What is your name?

Tamilini : Tamilini.

Mother : Tell me your mother's name.

Tamilini : Mrs. Sumathi.

Mother : Father's name?

Tamilini : Mr. Adhiyaman.

Mother : Tell me the name of your father's father?

Tamilini : You mean grandpa? Mr. Chidambaram.

Mother : Do you know the name of great grandpa. Mr. Chidambaram's father?

Tamilini : Grandma always used to tell me about one 'great grandpa'. You want that great grandpa's name, amma? mmm...

Info Bits

The term history has been derived from the Greek word "***Istoria***" which means 'learning by enquiry'.

Mother: Yes, Your great grandpa's name is Mr. Ramasamy. OK.

Often your father shows proudly a very old wooden pen and used to tell us that it was his grandpa's pen. Do you remember it?

Tamilini: Yes, amma! Normally he keeps it in a beautiful wooden case on his table. Is that the one?

Mother: You are right, Tamilini. We cannot write with that pen now. But, father has kept it as a treasure. If you ask your father about that, he will show you the diary written by your great grandpa with that old pen. From that diary, we come to know that your great grandpa was a literate, while most of his villagers were illiterates. Further, we can understand the lifestyle of that period and also about activities from his diary writings.

Tamilini: Can this small diary record so much of news, amma?

Mother: Yes, Tamilini. We understand the period and lifestyles of people of Old Stone Age from used stone tools, like what you understand about your grandpa and his time from his diary writing.

In ancient period, the people lived in caves, used to draw paintings in rocks called Rock Painting. They might have wished to record their activities through these paintings.

SOME MAJOR INDIAN EXCAVATED SITES

Tamilini: What are the other sources that help us understand the lifestyles of Stone Age people?

Mother: We came to know their hunting style through their paintings on the rocks and the walls of the caves.

Tamilini: Rock paintings? It sounds really surprising. Why did they draw these paintings?

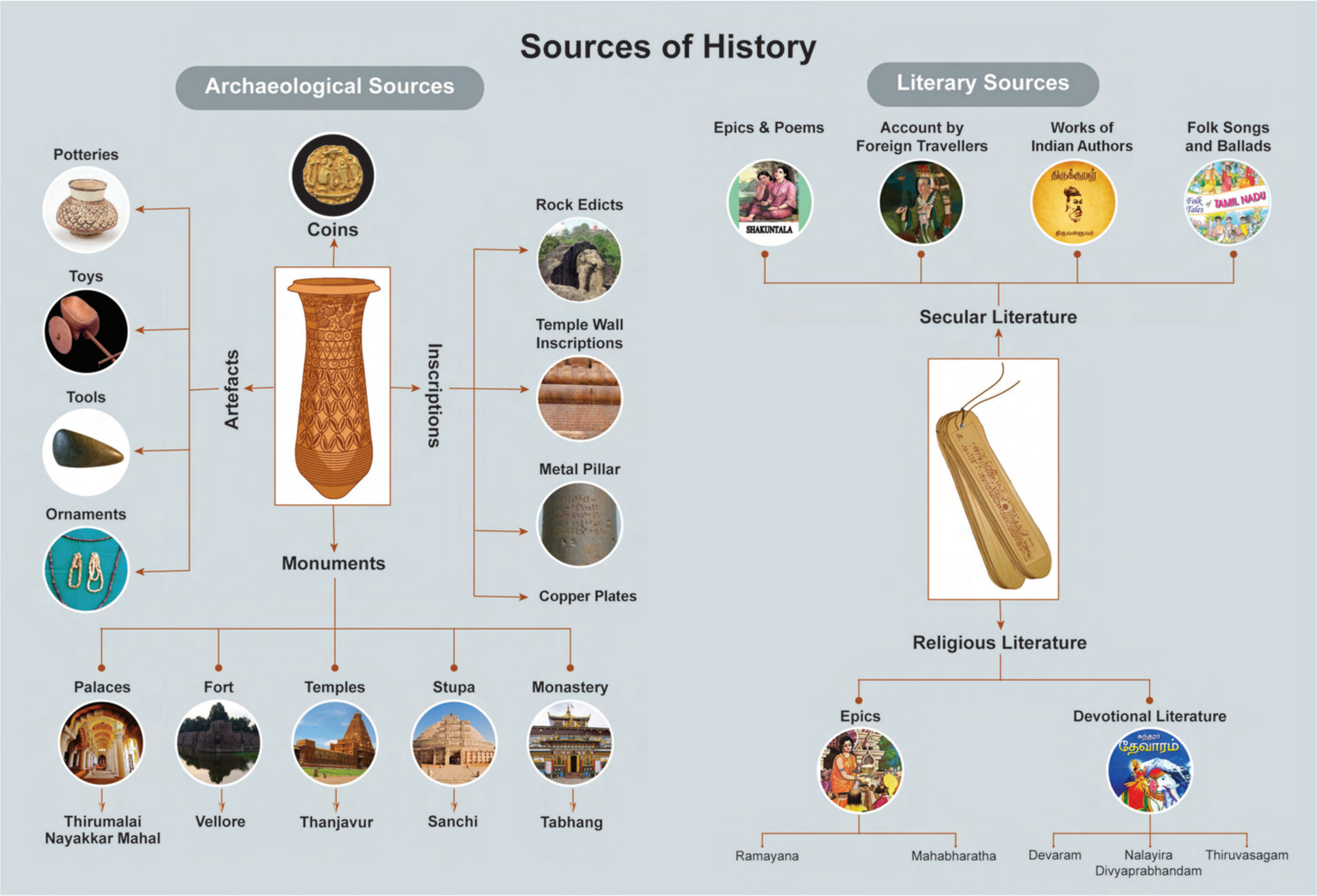
Info Bits

Numismatics – The study of Coins
Epigraphy- The study of inscription

Mother: Some would have stayed back, without joining the hunting team. So for their benefit, these pictures could have been drawn. They might have done it as a part of their pastime.

Tamilini: Certainly amma. That's how we identify their lifestyles. Isn't it, amma?

Mother: Well said, Tamilini. The period between the use of first stone tools and the invention of writing systems is pre-history. Stone tools, excavated materials and rock paintings are the major sources of pre-history.


Sources of History
Archaeological Sources
Potteries
Toys
Tools
Ornaments
Artefacts
Coins
Inscriptions
Rock Edicts
Temple Wall Inscriptions
Metal Pillar
Copper Plates
Monuments
Palaces
Fort
Temples
Stupa
Monastery
Thirumalai Nayakkar Mahal
Vellore
Thanjavur
Sanchi
Tabhang
Literary Sources
Epics & Poems
Account by Foreign Travellers
Works of Indian Authors
Folk Songs and Ballads
SHAKUNTALA
Folk Tales of TAMIL NADU
Secular Literature
Religious Literature
Epics
Devotional Literature
தேவாரம்
Ramayana
Mahabharatha
Devaram
Nalayira Divyaprabhandam
Thiruvasagam

CASE STUDY

A Mighty Emperor Ashoka

The most famous ruler of ancient India was Emperor Ashoka. It was during his period that Buddhism spread to different parts of Asia. Ashoka gave up war after seeing many people grieving death after the Kalinga war. He embraced Buddhism and then devoted his life to spread the message of peace and dharma. His service for the cause of public good was exemplary. He was the first ruler to give up war after victory. He was the first to build hospitals for animals. He was the first to lay roads. Ashoka Chakra with 24 spokes in our national flag was taken from the Sarnath Pillar of Ashoka.

Even though Emperor Ashoka was great, his greatness had been unknown until 19th century.The material evidence provided by William Jones, James Prinsep and Alexander Cunningham revealed the greatness of Emperor Ashoka.

Based on these accounts, Charles Allen wrote a book titled *The Search for the India's Lost Emperor,* which provided a comprehensive account of Ashoka. Many researches made thereafter brought Ashoka's glorious rule to light. These inscriptions were observed on the rocks, Sanchi Stupa and Sarnath Pillar and helped to understand the greatness of Ashoka to the world.

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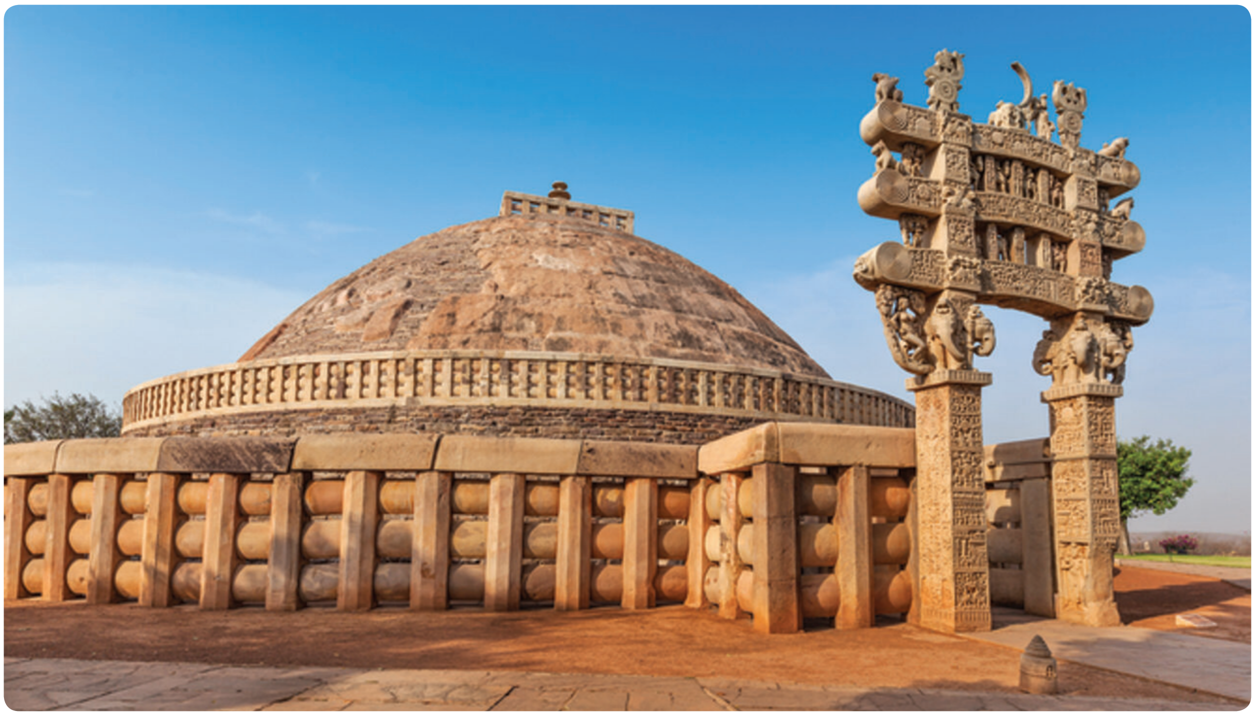
Sarnath Pillar



Sanchi Stupa

Now one can understand the importance of historical research. But for the efforts of scholars, the greatness of Emperor Ashoka would not have come to light.

Mother : Do you know what proto history is?

Tamilini: That is the period between pre history and history.

Mother : Exactly. The period for which records in writing are available but not yet deciphered is called proto history. Today, we are leading a safe life with all modern equipment. But our ancestors did not live in such a safe environment. There might have been chances of wild animals entering their caves. But, they realised that dogs could help them to prevent the entry of such dangerous animals by its sniffing skill. Hence they started domesticating dogs for their protection and hunting activities.

From this, we also know how inscriptions, monuments, copper plates, accounts of foreigners or foreign travellers and folk tales play a vital role in constructing and reconstructing history.

Tamilini: Now, I completely understand what history is, amma.

Thank you, amma.

Summary

- The life styles of pre historic people can be understood from the stone tools, rock paintings, fossils and other excavated materials.
- Proto history is the period between pre-history and history.
- Early humans domesticated dogs for their protection and hunting activities.
- Mighty Emperor Ashoka followed the path of peace and dharma.
- Ashoka Chakra with 24 spokes in our national flag was taken from Sarnath Pillar of Ashoka.

GLOSSARY

1.	Sources	-	a place, person, text or object from which some data can be obtained
2.	Ancestor	-	a person related to you who lived a long time ago
3.	Dharma	-	righteousness
4.	Monument	-	a statue, building or other structure built by a notable person
5.	Inscription	-	written records engraved on stones, pillars, clay or copper tablets, caves and walls of temples.
6.	Historian	-	A person who excelled in history

Exercises

I. Choose the correct answer

ED2TJ

1. What was the step taken by the early man to collect his food?

   a. Trade b. Hunting
   c. Painting d. Rearing of animals

II. Match the statement with the Reason. Tick the appropriate answer

1. *Statement:* Pre historic man went along with the dog for hunting.

Reason: Dogs with its sniffing power would find out other animals.

a. Statement is true, but reason is wrong.
b. Statement and reason are correct.
c. Statement is wrong, and reason is correct.
d. Both statements and reasons are wrong.

2. *Statement:* The objects used by the early man are excavated. They are preserved to know the lifestyle of the people.

Find out which of the following is related to the statement:

a. Museum b. Burial materials
c. Stone tools d. Bones

3. Find out the wrong pair

a. Old stone age	-	Stone tools
b. Rock paintings	-	Walls of the caves
c. Copper plates	-	A source of history
d. Cats	-	First domesticated

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4. Find the odd one

a. Paintings were drawn on rocks and caves.
b. There were paintings depicting hunting scenes.
c. It was drawn to show his family members about hunting.
d. The paintings were painted by using many colours.

III. Fill in the blanks

1. The Old Stone Age man lived mostly in ______________________________.
2. ____________ is the father of history.
3. ________________ was the first animal tamed by Old Stone Age man.
4. Inscriptions are _____________ sources.
5. Ashoka Chakra has ________ spokes.

IV. State True or False

1. Stone tools belonging to Old Stone Age have been excavated at Athtirampakkam near Chennai.
2. The materials used by the ancient people are preserved in the museums by the Archaeological Department.
3. During the period of Ashoka, Buddhism spread across the country.

V. Match the following

a. Rock paintings	-	copper plates
b. Written records	-	the most famous king
c. Ashoka	-	Devaram
d. Religious Literature	-	to understand the lifestyle

VI. Answer in one word

1. Can you say any two advantages of writing diary?
2. How do we know the people's lifestyle of the Old Stone Age?
3. Is inscription a written record?
4. What is proto history?
5. Name an epic.

VII. Answer the following

1. What is history?
2. What do you know about the pre historic period?
3. What are the sources available to know about the pre-historic period?
4. Mention the places from where we got pre-historic tools.
5. What are the benefits of a museum?
6. Name some tools used by early man to hunt animals.
7. Why were paintings drawn on rocks?
8. Name any two artefacts?

VIII. HOTS

1. How were dogs useful to pre historic men?
2. Compare the lifestyle of Old Stone Age man with present day lifestyle.

IX. Student Activity

1. Write down the important events of your family with years. Draw a timeline with the help of your teacher or with your classmates.
2. Early man used stones as a weapon. Make an album showing the various uses of stone.

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3. Identify the category of the following sources of history.

   a. Urns excavated from Adhichanallur.

   b. Copper plates of Velvikudi.

   c. *Mahabharatha*.

   d. Sanchi Stupa.

   e. *Pattinappaalai*.

   f. The earthernwares from Keezhadi.

   g. Toys of Indus Civilisation.

   h. Big Temple of Thanjavur.

X. Life Skill

1. Make some weapon models used by the Old Stone Age man using clay.
2. Discuss with your grandpa, grandma, neighbours and teachers and collect information about your street, village, town or school.

   With that collected data, try to write its history titling your writing as "I am a Historian".

XI. Answer Grid

Early men scribbled and painted on me...Today they used me to build houses and lay roads. who am I? **Ans:**	Name any two archaeological sources? **Ans:**	Name the types of literary sources? **Ans:**
Expand BC(BCE). **Ans:**	what is the meaning of the Greek word "Istoria" ? **Ans:**	Expand AD(CE). **Ans:**
______ is the study of inscriptions. **Ans:**	______ is the study of coins. **Ans:**	I can help you to talk, see, hear, write and read. There is no world without me. Who am I? **Ans:**

XII. Map work

Mark the following places in the political map of India.

a. Delhi b. Chennai

c. Tamil Nadu d. Andhra Pradesh

e. Kerala f. Karnataka

Internet Resources

1. What is History? www.community.dur.ac.uk
2. Helping Your Child Learn History. www.ed.gov

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ICT CORNER

What is History?

History in your hand, create a timeline.

Steps:

- Open the Browser and copy and paste the link given below (or) type the URL given (or) Scan the QR Code.
- Timeline page will open. Type your name and the project name in the corresponding boxes.
- Click on the empty timeline. A menu box will appear with Label, Description and Choose image boxes. Enter the details, choose the image and click the tick mark.
- After entering all the details in chronological order click "Finish" and "Save Final" to save your project.

Step1 Step2 Step3 Step4

Timeline Project's URL::

http://www.readwritethink.org/files/resources/interactives/timeline_2/

Pictures are indicative only

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Unit 2

Human Evolution

Learning Objectives

- To know the origins of humans
- To learn about the different stages of human evolution from nomadic hunting-gathering to a settled life
- To know about the stone implements of the pre historic humans
- To understand the use of fire and wheel
- To know the significance of rock paintings of the ancient humans

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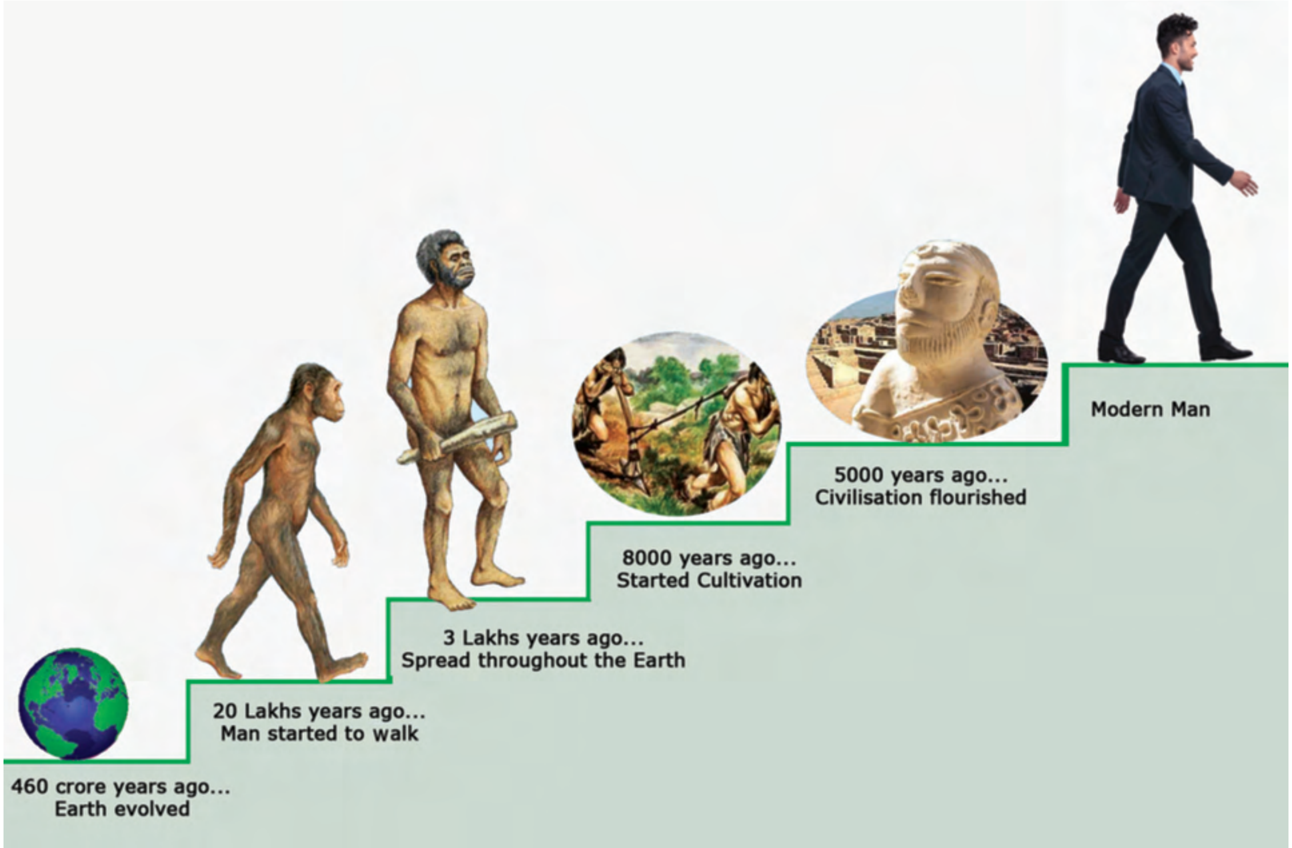

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Tamilini, a school student of Class VI, visited a Science Centre accompanied by her grandmother. There they saw a time machine. The operator of the time machine explained the working of the machine.

Operator: If you press different buttons in the machine, it would take you to the chosen period of time. Why don't you enjoy the experience of watching different periods of time using this machine?

(After listening to the operator, both Tamilini and her grandmother were excited and decided to have the experience of the time machine.)

Tamilini: Can we go forward and see how 2200 AD(CE) would be, grandma?

Grandma: What is so interesting about our future in 2200 AD(CE), Tamil? Let's go backward and see how our past was like.

> **DO YOU KNOW?**
> The story of human evolution can be scientifically studied with the help of archaeology and anthropology.

Tamilini: You sound right, grandma.

Grandma pushed the button to 1950 AD(CE). They saw mostly people walking, a few riding bicycles and buses appearing rarely on the roads. Slowly they moved back to 1850. There were no buses or cycles. Carts pulled by mules and bullocks were seen on the roads. Horse-drawn cart was a rare occurrence.

Tamilini then turned the button to 8,000 years back. People were engaged in raising crops and livestock. She pushed the button to get a picture of life 18,000 years ago. She saw the humans living in caves. They were using tools made of stones and bones for hunting. Tamilini was frightened by the hunting scene and pushed the button forward to return to the present.

Grandma: Are you afraid, Tamil?

Grandma urged Tamilini to go further backward to see the ancient humans who lived with the apes. But Tamilini was not inclined. So both of them left the spot.

Tamilini: Grandma, will you tell me the story of evolution of humans?

Grandma: Yes, certainly.

Grandma: Anthropologists have unearthed the footprints of humans in a country called Tanzania, which is in eastern Africa. They were found in rock beds submerged under the sand.

> **Info Bits**
> **Archaeology** is the study of pre historic humans remained materials used by pre historic humans. Excavated material remains are the main source for archaeological studies.

STAGES OF HUMAN EVOLUTION

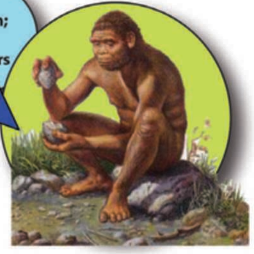
Australopithecus → Between 4 million and 2 million years → (Proto-human) Evolved in eastern Africa ("southern ape")

A mix of human and ape traits
Bipedal walk (walking on two legs)

Homo habilis → Between 2.3 and 1.4 million years. → (Proto- human)

Presence of big toe to hold tightly
and less protruding face. Tool maker

Homo erectus → Approximately 1.8 Million years ago → (Java man) Not fully human; brain smaller than ours

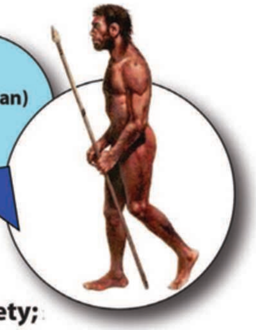


Walked in a straight position (Posture).
He had the knowledge of the fire

Neanderthal → Between 130,000 and 40,000 years. → (not fully human)

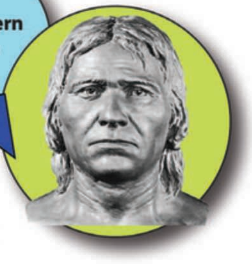
Different from Africans. Their tools were crude. Hunting skills were also poor. There are evidences of burying the dead. Evidences are seen at Neanderthal in Germany.

Homo Sapiens → 300,000 years ago → (wise man)



Modern human being; hunting and gathering society; still used crude stone implements. Moved out of Africa and settled in Europe and Asia.

Cromagnons the present Man → 50,000 years ago in eastern Africa and 40,000 years ago in West Asia and in south-eastern Europe. → The modern human



Beginning of human life; used not only implements made of stone but also of bone. Their weapons included harpoons and spear-throwers.

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Info Bits

Anthropology is the study of humans and evolutionary history.

The word anthropology is derived from two Greek words: anthropos meaning "man" or "human"; and logos, meaning "thought" or "reason." Anthropologists attempt, by investigating the whole range of human development and behavior, to achieve a total description of cultural and social phenomena.

Radio carbon dating was used to ascertain the period. It was found out that the foot prints of humans they had discovered were about 3.5 millions years old. When there is sudden change in nature, the living beings adapt themselves to the changes and survive. Humans have thus evolved over millions of years adapting themselves to the changing times.

DO YOU KNOW?

People and their Habitat

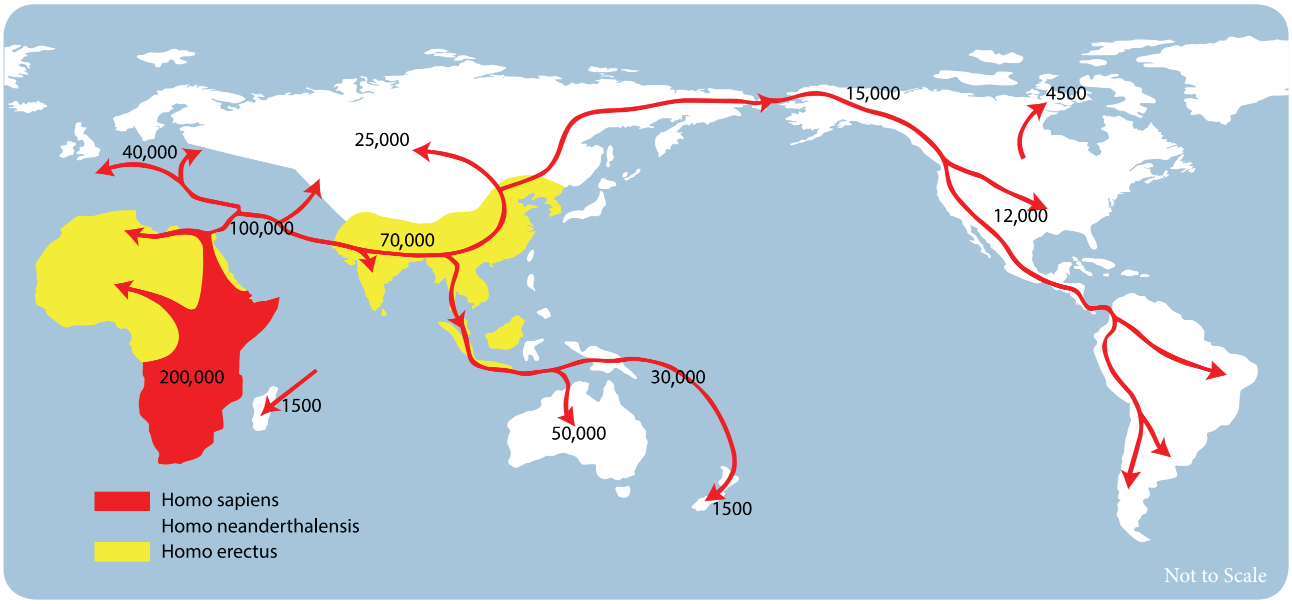
Australopithecus	- East Africa
Homohabilis	- South Africa
Homoerectus	- Africa and Asia
Neanderthal	- Eurasia (Europe and Asia)
Cro-Magnons	- France
Peking	- China
Homo sapiens	- Africa
Heidelbergs	- London

Info Bits

Cromagnons learned to live in caves.

Lascaus caves in France is the evidence for cave living of Cromagnons. They habitude to bury the dead.

Migration of *Homo sapiens from* east Africa to other parts of the world.



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Tamilini: Grandma, will you explain it in detail?

Grandma: Human evolution means the process through which the humankind changes and develops towards an advanced stage of life. See how the modern human has evolved.

1. Humans in erect position and walking on two legs happened much later.
2. Changes in thumb so that they can hold things tightly.
3. Development of brain.

Homo sapiens who migrated out of eastern Africa settled in different parts of the world. Their lifestyle also evolved and they made it suitable to the environs in which they lived. So humans in different places adopted different forms of lifestyle. Based on the weather, climate and nature of the living place, their physique and complexion also differed. This resulted in the formation of different races. Human procreation resulted in an increase in the population.

HOTS

Why did humans become hunter-gatherers? Did the landscape play any role?

Tamilini: Grandma, it's fantastic.

Grandma: Yes, it is. I shall now explain to you in detail how the Homo sapiens engaged in hunting and gathering.

Hunting and Food Gathering

Tamil, you will be surprised to know that millions of years ago, our ancestors led a nomadic life. They lived in groups in a cave or a mountain range. Each group consisted of 30 to 40 people. They kept on moving in search of food. They hunted pig, deer, bison, rhino, elephant and bear for food. They also ate the animals killed by other wild animals like tiger. They learnt the art of fishing. They collected honey from beehives, plucked fruits from the trees and dug out tubers from the ground. They also collected grains from the forest. Once the food resource got exhausted in one area, they moved to another place in search of food. They wore hides of animals and barks of trees and leaves for protecting their bodies during winter. So humans began hunting to satisfy their need for food.

Hunting Methods

1. Go as a group and hunt the prey.

2. Dig a pit and trap the animals and hunt.

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Art of Flaking

Keeping a stone in the bottom and sharpening it with another stone.

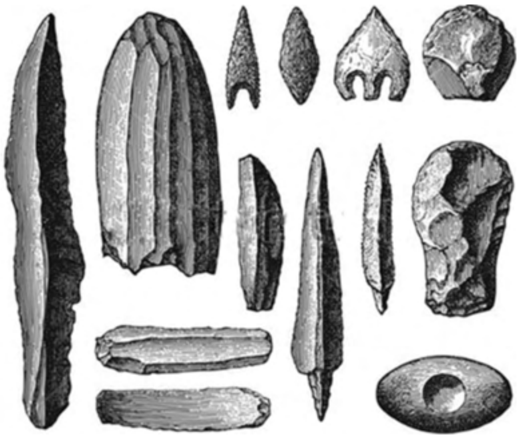
To make a stone tool, two stones were taken.One was used as a hammer to sharpen the other for removing flakes.

Grandma: Tamilini, do you know the weapons that the early humans used for hunting?

Tamilini: I have no idea, grandma. Can you tell me about hunting practices?

Stone Tools and Weapons

Grandma: Hunting was the main occupation of humans in the past. It was difficult for humans to kill a big animal with a stick or a stone. So they decided to use sharpened weapons.



The best stone for the making weapons was chikki – mukki kal (flint). It is known for its strength and durability. Humans spent many hours in search of a flint stone. They made sharp weapons and tools with the help of the stones and fitted them with

HOTS

Are there hunters in your area?

Why is hunting banned now?

wood to grip them. Humans created tools like axes with big stones.

Tamilini: Why were axes made, grandma?

Grandma: The axes were made to cut trees, remove barks, dig pits, hunt animals and remove the skin of animals.

Grandma: Tamil, do you know what the next stage was after making stone tools?

Tamilini: I don't know grandma. What would it be?

Grandma: Humans discovered the use of fire.

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DO YOU KNOW?

Even today in the villages of Nilgiris district in Tamil Nadu, people have the habit of making fire without use of match box.

At first, humans were afraid of fire and lightning. Probably fire caused by lightning had killed many wild animals. Humans tasted the flesh of the killed animals, which was soft and tasty. This made humans aware of the effect of fire. They used flint stone to make fire and used it to protect them from predators, for cooking food and for creating light during night. Thus fire became important for man in olden times.

HOTS

Is there any object that can bring heat and fire other than a match box?

Tamilini: What next, grandma?

Grandma: You will be surprised to know that the next human invention was the wheel. This was the first scientific invention of humans using their brain and cognitive skills.

Invention of the Wheel

The invention of wheel by humans is considered to be the foremost invention.

When humans saw the stones rolling down from the mountains, probably they would have got the idea of making the wheel.

Pot Making

Humans learned to make pot with clay. The invention of wheel made pot making easier, and the pots made were burnt to make it stronger. They decorated pots with lot of colours. The colour dyes were made from the extracts of roots, leaves or barks. These natural dyes were used in rock paintings.

Grandma: Can you identify what is in this picture?

Hunting scene in which men and women are taking part

Tamilini: Yeah. Some blurred tweaks are seen. Someone has drawn.

Grandma: No, this is our ancestor's handwork. In fact, it is the first art of humanity. Before the use of language, humans expressed their feelings through actions and also recorded it in rock paintings.

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Ancient Rock Paintings

In India, we can see many paintings in rocks and caves. The rock paintings give some information about the past. Approximately there are 750 caves, in which 500 caves have paintings. There are many more undiscovered caves. The rock paintings depict hunting pictures of the male and the female, dancing pictures and pictures of children playing.

Tamilini: Oh! We are able to gain some knowledge about the past lifestyle through these paintings. Isn't it, Grandma?

Grandma: You said it rightly, Tamil. These rock and cave paintings tell us many stories about our ancestors.

Tamilini: Okay, grandma! Now tell me how humans reached the next stage.

Grandma: There were many dangers involved in hunting. Due to large-scale hunting in the mountain areas and in the forests, many animals became extinct. Non availability of meat forced the humans to look for fruits and vegetables for food.

Tamilini: Now they would have thought of producing food for themselves. Is it not grandma?

From Nomadic to Settled Life : The World's Earliest Farmers

Grandma: Very well said, Tamil. The seed of fruits and the nuts they ate were thrown into the soil. During rains, the soil gave it life. Some days later, the saplings sprouted from the soil. By observation and logic, they learn that:

a. a plant grows from a single seed and yields lots of fruits and vegetables.
b. seeds that fall in the river beds sprout easily.
c. plants grow faster in water fed areas.
d. alluvial soil is more suitable for plant growth than any other.

With the above knowledge they gained, they realised that with proper sowing and nurturing, they could increase the number of plants more than the ones that grew naturally. Thus agriculture and farming came into existence. They domesticated the animals and used them in their farming.

Breeding of animals now became an important part of their life. Oxen were used for ploughing. Oxen made the practice of agriculture easier. Life was becoming organised than it was, when they were hunting. It enabled them to settle down in a place. Now with settlement came the problem of utensils and vessels for cooking and storage. The potter's wheel and fire solved this problem.

The invention of plough helped the farming practices. Farming started with the clearing of land and burning the left-over shrubs. They ploughed the land, sowed seeds in them and harvested the produce.

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During the pre historic period, humans lived in caves and depicted their daily events in drawings. Mostly pictures of animals were drawn.

Pre-Historic Rock Art of Tamilnadu

Keelvalai -Villupuram

Usilampatti - Madurai

Kumuthipathi - Coimbatore

Mavadaippu - Coimbatore

Porivarai cave-karikaiyur Nilgris

Once the fertility of the soil decreased, they moved to a new place. Initially agriculture was done for immediate food requirement. Later when they found out ways to increase production, they started storing the produce. The food products stored were used during the lean harvest periods. By their experience, they understood that land close to the river side was suitable for farming. So they decided to stay there permanently.

Tamilini: How about domestication of animals, grandma?

Grandma: Humans thought of ways to better their skills at hunting.

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They found out that the dogs could sniff other animals and chase them away. So humans found them useful for hunting. Thus dogs became the first animal to be domesticated by humans. Following the dogs, they started domesticating hen, goat and cow.

Tamilini: What next?

Grandma: Humans stayed on the plains for a long time. During this period, they have not only learnt agriculture, but slowly developed skills of handicraft. Permanent settlement in a place increased the yield of crops. Now they had grains in excess of what they consumed. The surplus grains were exchanged with other groups for the other things they were in need of. This is called the barter system. Thus trade and commerce developed and towns and cities emerged.

Tamilini: Thank you, grandma. The information you have shared with me is very helpful, and I would share it with my friends at school tomorrow.

Grandma: Very good. Congratulations Tamilini!

Summary

- Evolution means the process in which humankind changes and develops into an advanced stage.
- Homo sapiens migrated out of eastern Africa and settled in different parts of the world.
- Humans with the help of the Chikki mukki – kal (flint) made sharp weapons and tools.
- Fire was used by early human to protect him from predators, for cooking food and for the light during night.
- The invention of wheel is considered to be the foremost invention. It made pot making easier.
- We get knowledge about the past lifestyle through rock paintings.

A-Z GLOSSARY

1.	Time machine	-	a machine capable of taking a person backward or forward in time
2.	Evolution	-	gradual change leading to a more advanced development
3.	Predator	-	animal that hunts and kills other living things for food
4.	Footprints	-	the impression of the foot of a person or an animal
5.	Hides	-	tanned skin of an animal
6.	Million	-	1,000,000 (10 lakhs)
7.	Nomadic	-	Herdsmen without any fixed home moving about in search of pastures for their cattle.
8.	Barter	-	Exchange of goods without involving money
9.	Prey	-	An animal that is hunted and killed by another for food

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Exercises

I. Choose the correct answer

1. The process of evolution is ____________.

   a. direct b. indirect
   c. gradual d. fast

2. Tanzania is situated in the continent of ____________.

   a. Asia b. Africa
   c. America d. Europe

II. Match the statement with the Reason. Tick the appropriate answer

1. Statement: Migration of man of different Parts of the world resulted in changes of physic and colour

Reason: climatic changes.

a. Statement is correct.

b. Reason is wrong.

c. Statement and Reason is correct.

d. Statement and Reason is wrong.

III. Find out the Right pair

a. Australopithecus	-	Walked on both legs
b. *Homo habilis*	-	Upright man
c. *Homo erectus*	-	Wise man
d. *Homo sapiens*	-	Less protruding face

IV. Fill in the blanks :

1. ____________ unearthed the footprints of early humans in Tanzania.
2. Millions of years ago, our ancestors led a ____________ life.
3. The main occupations of the ancient humans were ____________ and ____________.
4. The invention of ____________ made farming easier.
5. Rock paintings are found at ______ in Nilgiris.

V. State True or False

1. Anthropology is the study of coins.
2. Homo erectus (Java man) had the knowledge of fire.
3. The first scientific invention of humans was wheel.
4. Goat was the first animal to be domesticated by humans.

VI. Answer in one word

1. What method is used to find out the age of the excavated materials?
2. What did early humans wear?
3. Where did early humans live?
4. Which animal was used for ploughing?
5. When did humans settle in one place?

VII. Answer the following

1. What is evolution?
2. Write any two characteristics of Homo sapiens?
3. Why did humans move from place to place?
4. Describe the ancient methods of hunting?
5. Why were axes made?
6. How would you define archaeology?
7. What do you know about anthropology?

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VIII. HOTS

1. Importance of invention of wheel from the ancient period to the modern period.

IX. Student Activity

Prepare an album collecting the pictures of ancient humans of different ages.

X. Answer Grid

The invention of ______________ made pot making easier. **Ans:**	Barter system means ______________. **Ans:**	Name any two weapons used by early human for hunting. **Ans:**
Which is the best stone for making weapons? **Ans:**	Towns and cities emerged because of ______________ and ______________. **Ans:**	Which was the first scientific invention of humans? **Ans:**
Identify the pictures in rock paintings. **Ans:**	Which was the main occupation of early humans? **Ans:**	What do cave paintings tell us? **Ans:**
Where did the early humans live? **Ans:**	______________ is related to the field of archaeology. **Ans:**	Name any two animals domesticated by early human. **Ans:**

XI. Life Skill

1. Make pots and tools by using clay.
2. Collect different types of moving dolls and tell them to change the wheels with different shapes like square, triangle etc., and find out how it moves.

XII. Map Work

On the outline map of India, mark the following places:

1. Adichanallur
2. Attirampakkam
3. Bhimbetka
4. Hunasagi Valley
5. Lothal

Internet Resources

1. www.humanorgins.sid.edu
2. www.yourgenome.org

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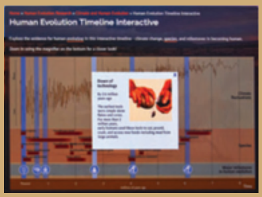
ICT CORNER

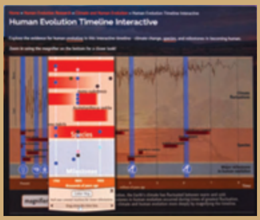
Human Evolution

Lets do this activity to create a Human Timeline.

Steps:

- Type the given URL in the browser.
- "Human Evolution Timeline Interactive" page will open. In the pictograph horizontal bottom blue line indicates "Major Milestone in Human Evolution" and pink colour indicates "Species". Interact with the pictograph by clicking any object on the graph.
- Click the Milestones to know the achivement of human during that period. The purple colour on the top of the pictograph indicates the climate fluctuation that shaped the evolution.
- Click the brushed reddish colour to identify the Species name, and its brief history on duration and geographical range. The Species range from "Sahelanthropus Tchadensis" to "Homo Sapiens". Use "Magnifier" button to enlarge a particular space on the timeline.


Step 1


Step 2

Step 3

Step 4

Timeline Project's URL:

http://humanorigins.si.edu/evidence/human-evolution-timeline-interactive

K4PG7

Pictures are indicative only

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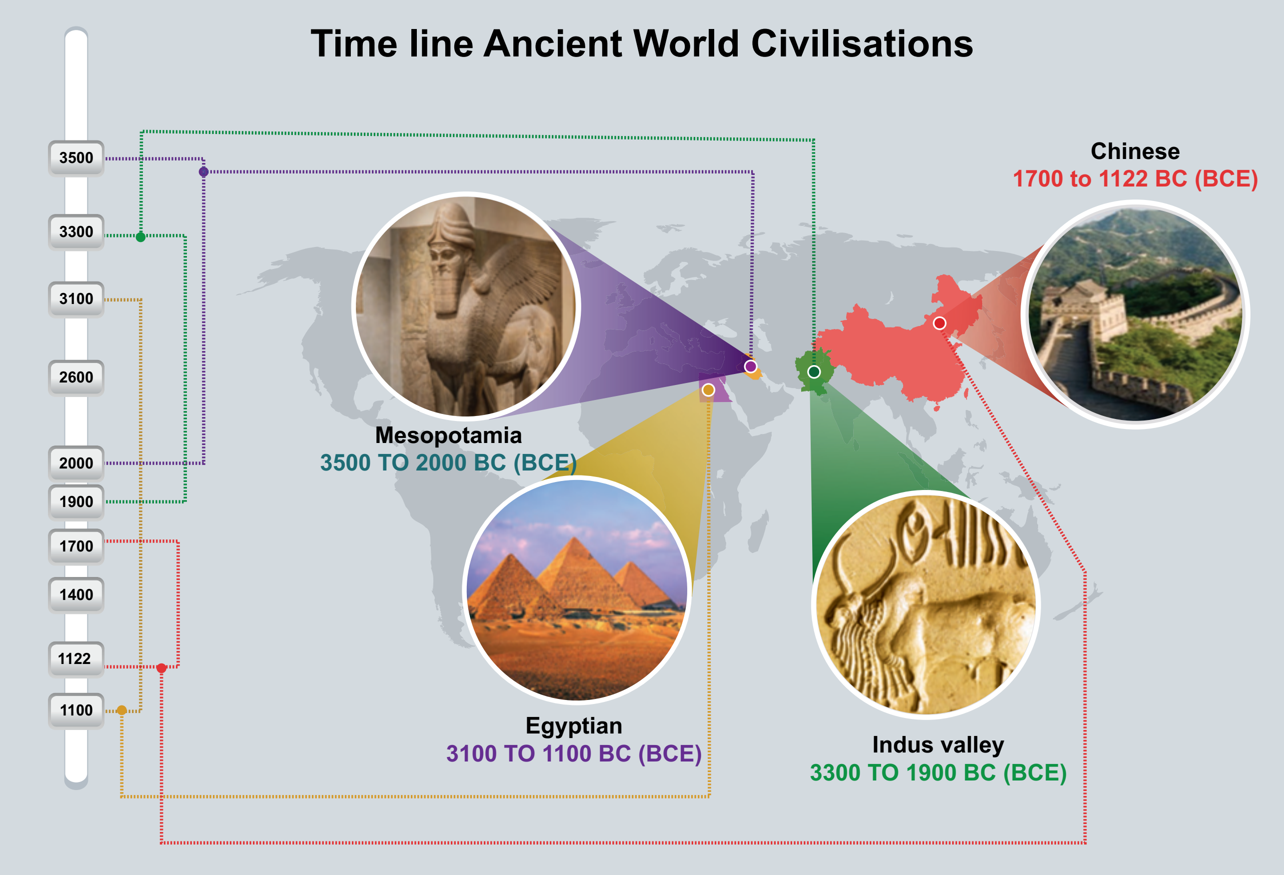
Unit 3

Indus Civilisation

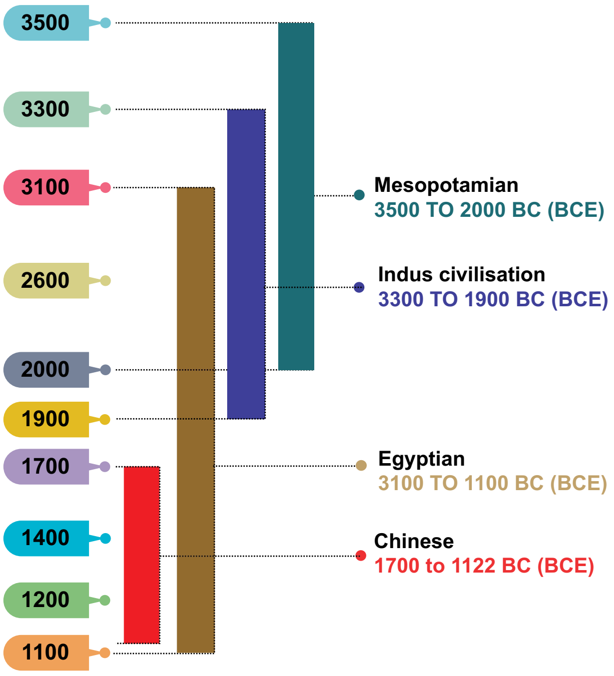
Learning Objectives

- To learn how Indus Civilisation is related to other contemporary civilisations
- To understand the urban nature of the Indus Civilisation
- To know the lifestyle of the people of this civilisation
- To identify and study the major sites of Indus Civilisation
- To mark their geographical location in maps



All these civilisations were established only in places near the rivers, most commonly along their banks.

Time line



Initially, people lived in groups. Then they formed communities out of these groups. Then evolved the societies which in due course become civilisations.

Why did people settle near rivers?

People preferred to settle near the rivers for the reasons given below.

- The soil is fertile.
- Fresh water is available for drinking, watering livestock and irrigation.
- Easy movement of people and goods is possible.

Discovery of a lost city – Harappa

The ruins of Harappa were first described by the British East India Company soldier and explorer Charles Masson in his book. When he visited the North-West Frontier Province which is now in Pakistan, he came across some mysterious brick mounds. He wrote that he saw a "ruined brick castle with very high walls and towers built on a hill". This was the earliest historical record of the existence of Harappa.

Sir John Marshall

In 1856 when engineers laid a railway line connecting Lahore to Karachi, they discovered more burnt bricks. Without understanding their significance, they used the bricks for laying the rail road.

In the 1920s archaeologists began to excavate the cities of Harappa and Mohenjo-Daro. They unearthed the remains of these long-forgotten cities. In 1924 the Director General of ASI, Sir John Marshall, found many common features between Harappa and Mohenjo-Daro. He concluded that they were part of a large civilisation.

Some slight differences are found in the earthenwares of Harappa and Mohenjo-Daro. This made the researchers conclude that Harappa was older than Mohenjo-Daro.

The **Archaeological Survey of India** (ASI) was started in 1861 with Alexander Cunningham as Surveyor. Its headquarters is located in New Delhi.

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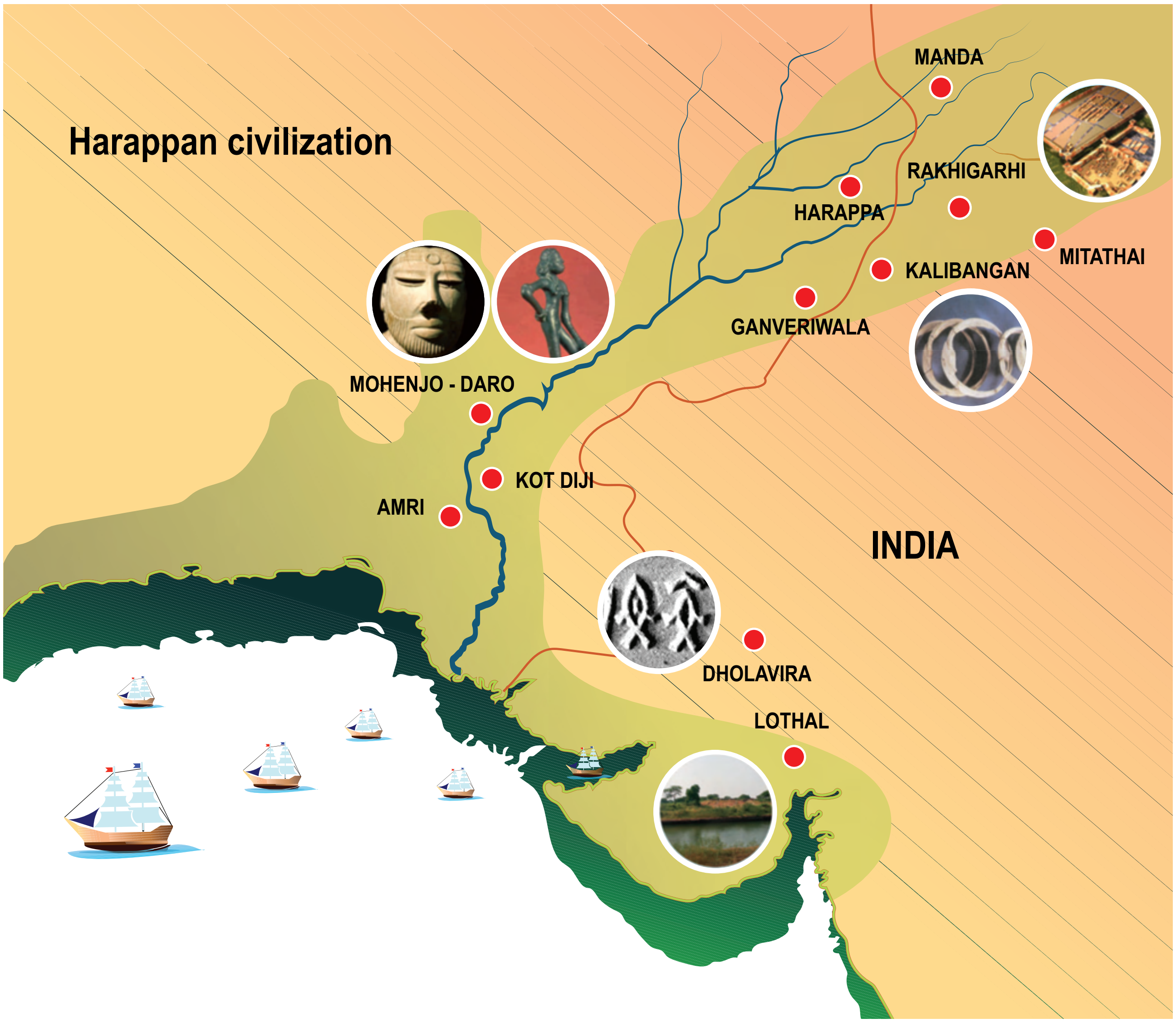
How do archaeologists explore a lost city?

- ✓ Archaeologists study the physical objects such as bricks, stones or bits of broken pottery (sherds) to ascertain the location of the city and time that it belong to.
- ✓ They search the ancient literary sources for references about the place.
- ✓ They look at aerial photographs of the excavation sites or cities to understand the topography.
- ✓ To see under the ground, they may use a magnetic scanner
- ✓ The presence and absence of archeological remains can be detected by RADAR and Remote Sensing Methods.

Sites in Indian borders

Archaeologists found major Harappan sites within Indian borders.



Observe the picture and fill the tabular column.

Name of the place	Name of the state	Important finds

Time Span of Indus Civilisation

Geographical range: South Asia

Period : Bronze Age

Time : 3300 to1900 BC(BCE) (determined using the radiocarbon dating method)

Area : 13 lakh sq.km

Cities : 6 big cities

Villages : More than 200

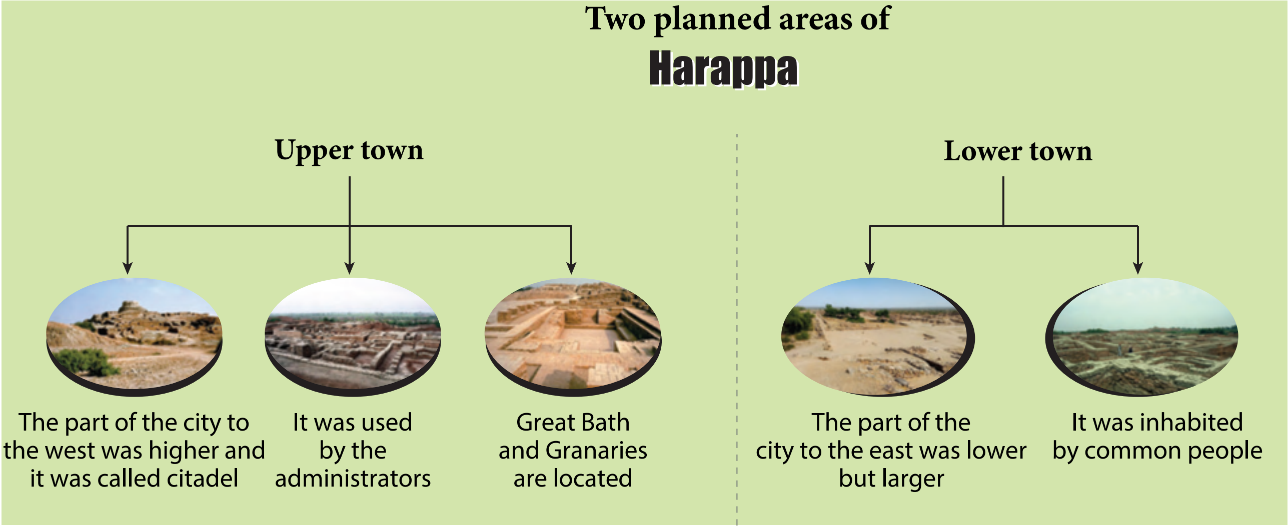
Urban Civilisation

Harappan civilisation is said to be urban because of the following reasons.

- Well-conceived town planning
- Astonishing masonry and architecture
- Priority for hygiene and public health
- Standardised weights and measures
- Solid agricultural and artisanal base

Unique Features of Harappan Civilisation

Town planning is a unique feature of the Indus Civilisation. The Harappan city had two planned areas.



Mehergarh – the Precursor to Indus Civilisation

Mehergarh is a Neolithic site. It is located near the Bolan Basin of Balochistan in Pakistan. It is one of the earliest sites known. It shows evidence of farming and herding done by man in very early times. Archaeological evidence suggests that Neolithic culture existed in Mehergarh as early as 7000 BC (BCE).

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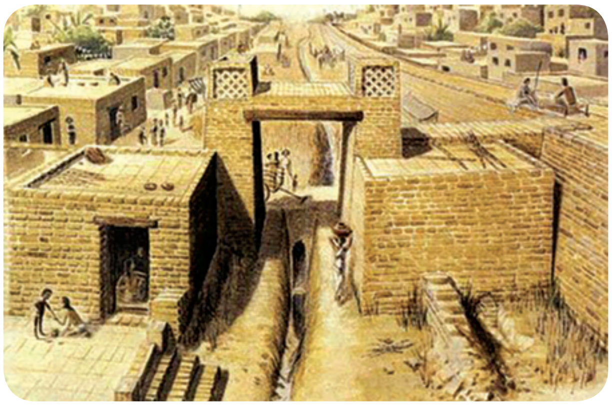
Streets and Houses



- The streets are observed to have a grid pattern. They were straight running from north to south and east to west and intersected each other at right angles.
- The roads were wide with rounded corners.
- Houses were built on both sides of the street. The houses were either one or two storeys.
- Most of the houses had many rooms, a courtyard and a well. Each house had toilets and bathrooms.
- The houses were built using baked bricks and mortar. Sun-dried bricks were also used. Most of the bricks were of uniform size. Roofs were flat.
- There is no conclusive evidence of the presense of palaces or places of worship.

DO YOU KNOW? **why burnt bricks are used in construction?**

They are strong, hard, durable, resistant to fire and will not dissolve in water or rain.

Info Bits

Bronze Age

It is a historical period characterised by the use of articles made of bronze.

Drainage System

- Many of these cities had covered drains. The drains were covered with slabs or bricks.
- Each drain had a gentle slope so that water could flow.
- Holes were provided at regular intervals to clear the drains.

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- House drains passed below many lanes before finally emptying into the main drains.
- Every house had its own soak pit, which collected all the sediments and allowed only the water to flow into the street drain.

The Great Bath (Mohenjo-daro)

- The great bath was a large, rectangular tank in a courtyard. It may be the earliest example of a water-proof structure.
- The bath was lined with bricks, coated with plaster and made water-tight using layers of natural bitumen.
- There were steps on the north and south leading into the tank. There were rooms on three sides.
- Water was drawn from the well located in the courtyard and drained out after use.

The Great Granary (Harappa)

- The granary was a massive building with a solid brick foundation.

- Granaries were used to store food grain.
- The remains of wheat, barley, millets, sesame and pulses have been found there.

> A granary with walls made of mud bricks, which are still in a good condition, has been discovered in Rakhigarhi, a village in Haryana, belonging to Mature Harappan Phase.

The Assembly Hall

The Assembly Hall was another huge public building at Mohenjo-Daro. It was a multi-pillared hall (20 pillars in 4 rows to support the roof).

Trade and Transport

- Harappans were great traders.
- Standardised weights and measures were used by them. They used sticks with marks to measure length.

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- They used carts with spokeless solid wheels.
- There is evidence for extensive maritime trade with Mesopotamia. Indus Seals have been found as far as Mesopotamia (Sumer) which are modern-day Iraq, Kuwait and parts of Syria.
- King Naram-Sin of Akkadian Empire (Sumerian) bought jewellery from the land of Melukha (a region of the Indus Valley) was mentioned in an epic regarding Naram-Sin.
- Cylindrical seals similar to those found in Persian Gulf and Mesopotamia have also been found in the Indus area. This shows the trade links between these two areas.

A naval dockyard has been discovered in Lothal in Gujarat. It shows the maritime activities of the Indus people.

Dockyard at Lothal

Lothal is situated on the banks of a tributary of Sabarmati river in Gujarat.

Leader in Mohenjo-Daro

- A sculpture of a seated male has been unearthed in a building, with a head band on the forehead and a smaller ornament on the right upper arm.
- His hair is carefully combed, and beard finely trimmed.
- Two holes beneath the ears suggest that the head ornament might have been attached till the ear.
- The left shoulder is covered with a shawl-like garment decorated with designs of flowers and rings.
- This shawl pattern is used by people even today in those areas.

Technology

- Indus people had developed a system of standardised weights and measures.
- Ivory scale found in Lothal in Gujarat is 1704mm (the smallest division ever recorded on a scale of other contemporary civilisations).

Info Bits

The word 'civilisation' comes from the ancient Latin word civis, which means 'city'.

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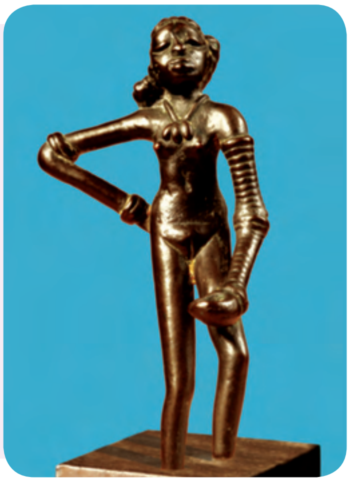
This little statue was found at Mohenjo-Daro. When Sir John Marshall saw the statuette known as the dancing girl, he said, "When I first saw them I found it difficult to believe that they were pre-historic modeling. Such as this was unknown in the ancient worlds up to the age of Greece. I thought that these figures had found their way into levels some 3000 years old to which they properly belonged".



KVT Complex (Korkai-Vanji-Thondi) spread over Afghanistan and Pakistan has many places, names of those were mentioned in sangam literature.

Korkai, Vanji, Tondi, Matrai, Urai and Kudalgarh are the names of places in Pakistan.

Gurkay and Pumpuhar in Afghanistan are related to the cities and ports mentioned in the Sangam Age. The names of the rivers Kawri and Poruns in Afghanistan and the rivers Kaweri Wala and Phornai in Pakistan also occur in the Sangam literature.

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Do you know The hidden treasures of the Indus civilisation

Inscriptions (written in a script of those times) can provide us information about customs, practices and other aspects of any place or time. So far, the Indus script has not been deciphered. Therefore, we must look for other clues to know about the Indus people and their lifestyle.

Apparel

- Cotton fabrics were in common use.
- Clay spindles unearthed suggest that yarn was spun.
- Wool was also used.

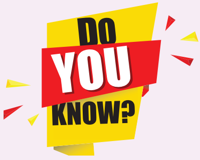
Love and peace

- Settlements were built on giant platforms and elevated grounds.
- The Indus Civilisation seems to have been a peaceful one. Few weapons were found and there is no evidence of an army.
- They displayed their status with garments and precious jewellery.
- They had an advanced civic sense.

Ornaments

- Ornaments were popular among men and women.
- They adorned themselves with necklaces, armlets, bangles, finger rings, ear studs and anklets.
- The ornaments were made of gold, silver, ivory, shell, copper, terracotta and precious stones.

Horse and iron were unknown to the people of Indus.



Indus people used the red quartz stone called Carnelian to design jewellery.

Info Bits

Copper was the first metal discovered and used by humans.

Who Governed them?

Historians believe that there existed a central authority that controlled planning of towns and overseas trade, maintenance of drainage and peace in the city.

Occupation

- The main occupation of the Indus Civilisation people is not known. However, agriculture, handicrafts, pottery making, jewellery making, weaving, carpentry and trading were practiced.
- There were merchants, traders and artisans.
- Rearing of cattle was another occupation.
- People of those times knew how to use the potter's wheel.
- They reared domesticated animals.

Pottery

- Pottery was practiced using the potter's wheel. It was well fired. Potteries were red in colour with beautiful designs in black.
- The broken pieces of pottery have animal figures and geometric designs on it.

Religious Belief

We don't have any evidence pointing to specific deities or their religious practices. There might have been worship of Mother Goddess (which symbolized fertility), which is concluded based upon the excavation of several female figurines.

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Toy Culture

Toys like carts, cows with movable heads and limbs, clay balls, tiny doll, a small clay monkey, terracotta squirrels eating a nut, clay dogs and male dancer have been found.

They made various types of toys using terracotta, which show that they enjoyed playing.

Info Bits

The earliest form of writing was developed by Sumerians.

What happened to Harappans?

By 1900 BCE, the Harappan culture had started declining. It is assumed that the civilisation met with

- repeated floods
- ecological changes
- invasions
- natural calamity
- climatic changes
- deforestation
- an epidemic

Do You Know?

Archaeological site at Mohenjo-Daro has been declared as a World Heritage Site by UNESCO.

Do You Know?

Radiocarbon Dating Method: A Standard Tool for Archaeologists

Also known as C_{14} method, the radiocarbon method uses the radioactive isotope of carbon called $carbon_{14}$ to determine the age of an object.

General Facts about Indus Civilisation

- It is among the oldest in the world.
- It is also the largest among four ancient civilisations.
- The world's first planned cities are found in this civilisation.
- The Indus also had advanced sanitation and drainage system.
- There was a high sense of awareness on public health.

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Summary

- When man began to live in a settled life, it marked the dawn of civilisation.
- River valleys were responsible for the growth of civilisation.
- Harappan culture was mainly urban in nature.
- Cities were well planned with covered drainage and straight wide roads, cutting each other at right angles.
- The people of that time had great engineering skills.
- The Great Bath is one of the earliest public tank.
- The civilisation extended from:

  Makran coast of Baluchistan in the west

  Ghaggar-Hakra river valley in the east

  Afghanistan in the north east

  Maharashtra in the south

A-Z GLOSSARY

1	Archaeologist	_	one who studies the remains of the past by excavations and explorartion
2	Excavate	_	to uncover by digging away
3	Urbanisation	_	population shift from rural areas to urban areas
4	Pictograph	_	a record consisting of pictorial symbols
5	Steatite	_	a soft variety of talc stone
6	Spindles	_	a device used to spin clothes
7	Bitumen	_	water-proof tar
8	Artefact	_	an object shaped by human craft of historical interest
9	Dockyard	_	an enclosed area of water in a port for loading, unloading and repair of ships
10	Seal	_	an embossed emblem, figure or symbol

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Elsewhere in the World

The Great Pyramid of Giza built by king Khufu in 2500 BCE, built with lime stone

Mesopotamia (Sumerian period) **Ur Ziggurat** built by king Ur Nammu in Honour of the Moon God Sin

Abu Simbel Site of two temples built by Egyptian king Ramises II

Exercises

I. Choose the correct answer

1. What metals were known to the people of Indus Civilization?
   a. Copper, bronze, silver, gold, but not iron
   b. Copper, silver, iron, but not bronze
   c. Copper, gold, iron, but not silver
   d. Copper, silver, iron, but not gold
2. Indus Civilisation belonged to
   a. old Stone age
   b. Medieval stone age
   c. New stone age
   d. Metal age
3. River valleys are said to be the cradle of civilisation because
   a. Soil is very fertile.
   b. They experience good climate.
   c. They are useful for transportation.
   d. Many civilisations flourished on river valleys.

II. Match the Statement with the Reason. Tick the appropriate answer

1. **Statement:** Harappan civilization is said to be an urban civilization.

   Reason: It has well planned cities with advanced drainage system.
   a. Statement and reason are correct.
   b. Statement is wrong.
   c. Statement is true, but the reason is wrong.
   d. Both statement and reason are wrong.
2. **Statement:** Harappan civilization belongs to Bronze Age.

   Reason: Harappans did not know the use of iron.
   a. Statement and reason are correct.
   b. Statement is wrong.
   c. Statement is correct, but the reason is wrong.
   d. Both statement and reason are wrong.

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3. **Statement:** The engineering skill of Harappans was remarkable.

   Reason: Building of docks after a careful study of tides, waves and currents.

   a. Statement and reason are correct.

   b. Statement is wrong.

   c. Statement is correct, but the reason is wrong.

   d. Both statement and reason are wrong.

4. Which of the following statements about Mohenjo-Daro is correct?

   a. Gold ornaments were unknown.

   b. Houses were made of burnt bricks.

   c. Implements were made of iron.

   d. Great Bath was made water tight with the layers of natural bitumen

5. Consider the following statements.

   1. Uniformity in layout of town, streets, and brick sizes
   2. An elaborate and well laid out drainage system
   3. Granaries constituted an important part of Harappan Cities

   Which of the above statements are correct?

   a. 1&2   b. 1&3

   c. 2&3   d. all the three

6. Circle the odd one

   Oxen, sheep, buffaloes, pigs, horses

7. Find out the wrong pair

a. ASI	–	John Marshall
b. Citadel	–	Granaries
c. Lothal	–	dockyard
d. Harappan civilisation	–	River Cauvery

III. Fill in the Blanks

1. ___________ is the oldest civilisation.
2. Archaeological Survey of India was founded by ___________.
3. ___________ were used to store grains.
4. Group of people form ___________.

IV. State True or False

1. Mehergarh is a Neolithic site.
2. Archaeological survey of India is responsible for preservation of cultural monuments in the country.
3. Granaries were used to store grains.
4. The earliest form of writings was developed by Chinese.

V. Match the following

Mohenjo-Daro	-	raised platform
Bronze	-	red quartz stone
Citadel	-	alloy
Carnelian	-	mound of dead

VI. Answer in one or two sentences

1. What are the uses of metal?
2. Make a list of baked and raw foods that we eat.
3. Do we have the practice of worshipping animals and trees?
4. River valleys are cradles of civilisation. Why?
5. Just because a toy moves doesn't mean its modern. What did they use instead of batteries?
6. Dog was the first animal to be tamed. Why?
7. If you were an archaeologist, what will you do?
8. Name any two Indus sites located in the Indian border.

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9. In Indus civilisation,which feature you like the most? Why?
10. What instrument is used nowadays to weigh things?

VII. Answer the following

1. What method is used to explore buried buildings nowadays?
2. Why Indus Civilisation is called Bronze Age civilisation?
3. Indus Civilisation is called urban civilisation. Give reasons.
4. Can you point out the special features of their drainage system?
5. What do you know about the Great Bath?
6. How do you know that Indus people traded with other countries?

VIII. HOTS

1. Observe the following features of Indus Civilisation and compare that with the present day.
   a. Lamp post
   b. Burnt bricks
   c. Underground drainage system
   d. Weights and measurement
   e. Dockyard
2. Agriculture was one of their occupations. How can you prove this? (with the findings)
3. Many pottery and its pieces have been discovered from Indus sites. What do you know from that?
4. A naval dockyard has been discovered in Lothal. What does it convey?
5. Can you guess what happened to the Harappans?

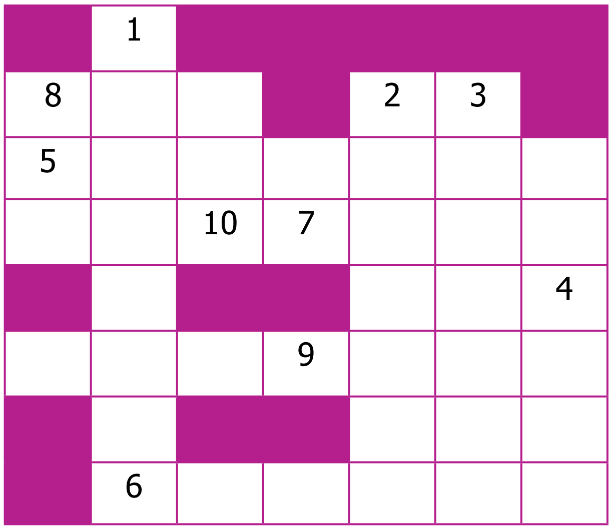
IX. Student Activity

1. Prepare a scrap book.

   (Containing more information about objects collected from Mohenjo-Daro and Harappa.)
2. You are a young archaeologist working at a site that was once an Indus city. What will you collect?
3. Make flash cards.

   (Take square cards and stick picture in one card and the information for the same picture in another card. Circulate among the groups and tell them to match the picture with information.)
4. Draw your imaginary town planning in a chart.
5. Make a model of any one structure of Indus Civilisation using clay, broken pieces of bangles, matchsticks, woollen thread and ice cream sticks.
6. Can you imagine how toys have changed through the ages? Collect toys made of

   Clay -> stone -> wood -> metal -> plastic -> fur -> electric -> electronic ->???
7. Crossword puzzle.



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Top to Bottom

1. Director General of ASI.
2. ________ is older than Mohenjo-Daro.
3. This is ________ age civilisation.
4. Each house had a ________.

Left to Right

5. Place used to store grains.
6. A dockyard has been found.
7. ________ is unknown to Indus people.
8. It is used to make water tight.

Right to Left

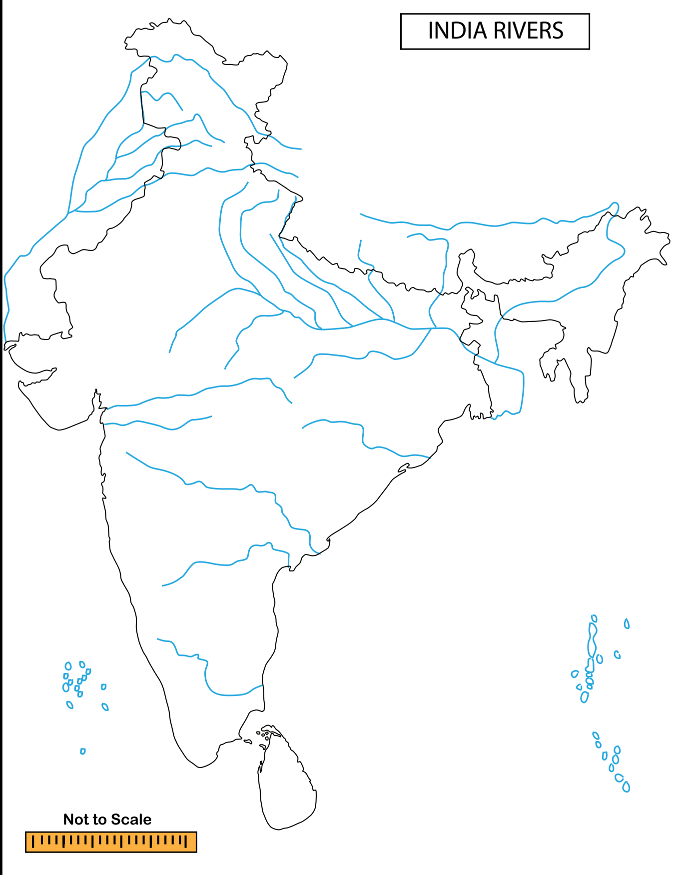
9. From this we can get lot of information.
10. This is responsible for research.

Rapid Fire Quiz (Do it in groups)

1. Which crop did Indus people use to make clothes?
2. Which was the first Indus city discovered?
3. Where was Indus Civilisation?
4. Which animal was used to pull carts?
5. Which metal was unknown to Indus people?
6. What was used to make pots?
7. Which is considered the largest civilisation among four ancient civilisations of the world?

X. Life skill

1. Making an animal or a pot out of clay.
2. Making terracotta toy with movable limbs.
3. Pot painting (with geometric pattern).
4. Make informational charts and posters.



XI. Map Work

1. Mark any four Indus sites located within the Indian border.
2. On the river map of India, colour the places where Indus civilisation spread.
3. Mark the following places in the given India map:
   a. Mohenjo-Daro
   b. Chanhudaro
   c. Harappa
   d. Mehergarh
   e. Lothal

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XII. Answer Grid

What did Charles Masson see? **Ans:**	List three things people used which we use today? **Ans:**	What else has been found? **Ans:**
Can you say three things unknown to Indus people? **Ans:**	Which metal was unknown to Indus people? **Ans:**	Which is the oldest civilisation in the world? **Ans:**
Why dog was the first animal to be tamed? **Ans:**	Who were the first people to grow cotton? **Ans:**	Which institution is responsible for archaeological research? **Ans:**
Was there any river valley civilisation found in TamilNadu? **Ans:**	Name any two Harappan sites which were found in Indian border? **Ans:**	Can we say the Indus cities as cities of children? **Ans:**

Internet Resources

1. http://www.thenagain.info/webchron/india/harappa.html
2. http://www.archaeologyonline.net/artifact/harappa-mohenjodaro.html
3. http://en.m.wikipedia.org
4. www.harappa.com

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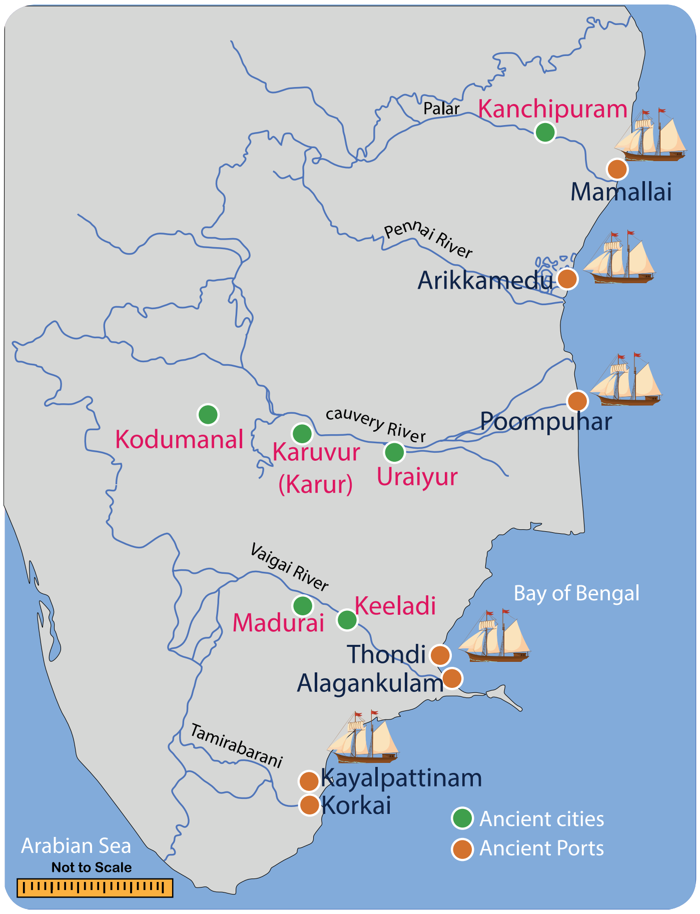
Unit 4

Ancient Cities of Tamilagam

Learning Objectives

- To learn about the greatness of the towns of ancient Tamilagam
- To know about Poompuhar, Madurai and Kanchi
- To understand the ancient kingdoms of Tamilagam
- To gain knowledge about the crafts, markets, manufactures, maritime trade, education and water management in ancient Tamilagam



[It is a Government Higher Secondary School. Reciprocating the greetings of the students of VI Std, the Social Science Teacher signals them to get seated]

Teacher: Wow! You look pretty in your new dress, Tamilini.

Students: Ma'm, today is her birthday.

Teacher: Wish you a happy birthday Tamilini. Many more happy returns of the day.

Tamilini: Thank you, ma'm.

Teacher: Ok children. Shall we start today's class from Tamilini's birthday.

Students: How come ma'm? What is the connection between Tamilini's birthday and today's class?

Teacher: There is. I shall come to that later. Let us stand up and wish her first.

Students: Happy birthday, Tamil.

Tamilini: Thank you all.

Teacher: Tamil, Is Chennai your home town?

Tamilini: No ma'm. My home town is Kadavur near Karur.

Teacher: Good. Do you have the habit of visiting your home town?

Tamilini: Yes ma'm. Every summer I visit my home town.

Teacher: Excellent! Can you tell me the difference between Kadavur and Chennai?

Tamilini: Kadavur is a village. Chennai is a city.

Teacher: Excellent!

Teacher: Can you tell what were the earliest planned cities of ancient India?

Students: Harappa and Mohenjo-Daro, ma'm.

Teacher: Yes. Very good children. Today we are going to study about the ancient towns of Tamilagam. They are Poompuhar, Madurai, Kanchi. Shall we start?

Students: Ok ma'm.

Teacher: See we have started today's lesson with Tamilini's birthday.

Students: Yes mam.

> **DO YOU KNOW?**
>
> Mesopotamian civilisation is the earliest civilisation in the world. It is 6500 years old.

Teacher: Like Harappa and Mohenjo-Daro in ancient India, there were famous towns in ancient Tamilagam too. Madurai, Kanchi and Poompuhar are prominent among them.

Tamil literature, accounts of foreign travellers and archaeological finds provide us information about the ancient towns of Tamilagam.

Poompuhar

Poompuhar is one of the oldest towns in ancient Tamilagam. This is the place where well known characters of Silapathikaram, Kovalan and Kannagi lived. It was also a port town along the Bay of Bengal. The ports were established for facilitating maritime trade. Even in times past, countries began to export their surplus products and import the scarce commodities by sea. Poompuhar is one such historic port that emerged in the wake of increasing maritime trade. It is a coastal town near the present-day Mayiladuthurai and is located where the river Cauvery drains into the sea.

Poompuhar Port

Poompuhar was also known by names such as Puhar and Kaveripoompattinam. It served as the port of the early Chola kingdom. One of the popular Sangam Literature, *Pattinappaalai* and Tamil epics, *Silappathikaram* and *Manimegalai*, have references to the brisk sea-borne trade that took place in the port city, Puhar.

Silappathikaram, in particular, speaks about the greatness of Poompuhar.

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The lead female character of *Silappathikaram* is Kannagi. Her father is Maanaigan. Sea traders are known by the name Maanaigan. The male character Kovalan's father is Maasathuvan. Massathuvan means a big trader. It is clear from the text that Poompuhar was a place where big traders and sea traders had settled down.

Numerous merchants from foreign countries such as Greece and Rome landed at Poompuhar. Due to busy and continuous trade, many of them stayed on indefinitely in Poompuhar. There are evidences of foreigner's settlements in the town. People speaking many languages inhabited Poompuhar in its glorious days. As loading and unloading of ships took some months, the foreign traders began to interact with the local people during that period. This enabled the natives to learn foreign languages for communication. Similarly, the foreigners also learnt Tamil to communicate with the natives. This contact facilitated not only exchange of goods but also languages and ideas resulting in cultural blending.

The traders of Poompuhar were known for their honesty and integrity. They sold goods at legitimate prices. *Pattinappaalai* states that "selling any commodity at a higher price was considered bad".

The author of *Pattinappaalai*, Kadiyalur Uruttirangannanar, belonged to 2nd century BC(BCE). This is indicative of Puhar's antiquity. Horses were imported by sea. Pepper was procured through the land route. Gold that came from Vadamalai was polished and exported to the overseas countries. Sandal from Western Ghats, pearls from southern sea, corals from eastern sea and food items from Eelam were imported.

Poompuhar had been built differently from other towns. Each social group had a separate settlement. Streets were broad and straight, dotted with well-designed houses. There was also a dockyard.

We can learn about the life of the people of Puhar by reading Pattinappaalai and "Puhar Kandam" of *Silappathikaram.*

Puhar was a busy port upto 200 AD(CE). It might have been either washed away by sea or destroyed by big shore waves. The remains of that destruction can still be seen in the present Poompuhar town.

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Madurai

Madurai has been one of the oldest cities in India. Its antiquity can be understood from the sobriquet "Sangam Valartha Nagaram" it has earned.

Pandyas, the Cholas and later the Kalabras ruled Madurai in the ancient period. During medieval times, later Cholas and later Pandyas followed by the Nayaks ruled this historic town. This has resulted in cultural blending. Trade flourished and evidence for this has been unearthed in archaeological excavation done in Keezhadi near Madurai.

Madurai is proudly associated with tamil sangam (academies), which worked for the promotion of Tamil language. Forty-nine poets were associated with the last Sangam. Ahil, fragrant wood, was brought from Port Thondi to Madurai. King Solomon of ancient Israel imported pearls from Uvari near the Pandyan port, Korkai.

A mint of Roman coins was present at Madurai. The coins of other countries were also minted at Madurai, which is a proof for the glory of Madurai.

The fame of Madurai is attested by the accounts of the Greek historian Megasthanese. Chanakya, Chandragupta's minister, makes a mention of Madurai in his book, *Arthasastra*.

In the moat around the town, tunnels had been constructed in such a way that even elephants could comfortably enter.

Thoonga Nagaram

Madurai had Naalangadi and Allangadi.

Naalangadi – Day Market.

Allangadi – Evening Market.

Madurai is known as Thoonga Nagaram (the city that never sleeps). Madurai was a safe place where women purchased things from Allangadi without any fear.

Kanchi

A place of learning is called school. Several schools were established in great numbers for the first time in Kancheepuram. Jains studied in *Jainapalli*, and Buddhists studied in Viharas.

The greatness of Kanchi as an educational centre can be understood from the fact that the Chinese traveller Hieun Tsang who studied at Nalanda

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Hieun Tsang

University visited Kanchi 'Kadigai' to pursue his further studies.

Poet Kalidasa says, "Kanchi is the best of the towns". Tamil poet saint Thirunavukarasar praises Kanchi as "Kalviyil Karaiillatha Kanchi".

Hieun Tsang remarked that Kanchi can be counted as one among the seven sacred places like Bodh Gaya and Sanchi. Kanchi is the oldest town in Thondai Nadu. Scholars like Dharmabalar, Jothibalar, Sumathi and Bodhi Dharmar were born in Kanchi.

Kanchi is also known as the temples city. The famous temple of great architectural beauty, Kailasanathar temple, was built by later Pallava king Rajasimha at Kanchi. During the Pallava period, a large number of cave temples were built. The Buddhist monk Manimegalai spent the last part of her life at Kanchi speaks highly of that town.

Water management played an important role in the agrarian society of those times. Hundreds of lakes were created for storing water around the town of Kanchi. These lakes were well connected with canals. During the later period, Kanchi came to be known as the district of lakes. Water management skills of the ancient Tamils can be understood from the construction of Kallanai in the Chola country and the lakes and canals in Kanchi.

Apart from Poompuhar, Madurai and Kanchi, there were other towns too in ancient Tamilagam. Korkai, Vanchi, Thondi, Uraiyur, Musiri, Karuvur, Mamallapuram, Thanjai, Thagadoor and Kaayal are some of them. By conducting archaeological research, more information can be gathered about these places.

Thank you students. With this, we shall complete this lesson now.

- Poompuhar was a port.
- Madurai was a trading town.
- Kanchi was an educational centre.

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Tamil sayings represent the uniqueness of each ancient Tamil kingdom

Chola Nadu	-	sorudaithu (rice in abundance).
Pandya Nadu	-	muthudaithu (pearls in abundance).
Chera Nadu	-	vezhamudaithu (elephants in abundance).
Thondai Nadu	-	Saandrorudaithu (scholars in abundance)

Chera Nadu	-	Comprised Malayalam-speaking regions and Tamil districts of Coimbatore, Nilgiris, Karur, Kanniyakumari and Some parts of present Kerala.
Chola Nadu	-	Present-day Thanjavur, Tiruvarur, Nagai, Trichy and Pudukkottai districts.
Pandya Nadu	-	Erstwhile composite Madurai, Ramanathapuram, Sivagangai, Thuthukkudi and Tirunelveli districts
Thondai Nadu	-	Present-day Kancheepuram, Dharmapuri, Tiruvallur, Tiruvannamalai, Vellore and northern parts of Villupuram districts.

Summary

- Madurai, Kanchi and Poompuhar are famous towns in ancient Tamilagam.
- We know about the life of the people of Poompuhar by reading Silappathikaram and Pattinappaalai.
- Madurai is associated with three sangams.
- Kanchi was an educational centre. Many great scholars were associated with it.
- Kanchi known as a city of temples, was also known for water management.

A-Z GLOSSARY

1	Maritime Trade	-	trade by sea
2	Foreigner	-	a person who comes from another country
3	Blending	-	the mixings
4	Integrity	-	the quality of being honest
5	Legitimate prices	-	reasonable prices
6	Antiquity	-	a long time ago
7	Sobriquet	-	nick name
8	Mint	-	A place where coins are made
9	Moat	-	a deep and wide trench filled with water surrounding a palace

Exercises

I. Choose the correct answer

1. Which of the following region has a city more than 6500 years old?
   a. Iraq
   b. Indus Valley
   c. Tamilagam
   d. Thondaimandalam
2. Which one of the following is a Tamil city?
   a. Iraq
   b. Harappa
   c. Mohenjo-Daro
   d. Kancheepuram
3. Which city is not related to the Bay of Bengal?
   a. Poompuhar
   b. Thondi
   c. Korkai
   d. Kancheepuram
4. Water management system of Tamils are known from
   a. Kallanai
   b. Tanks in Kancheepuram
   c. Prakirama Pandyan Tank
   d. River Cauvery

   a. is correct   b. is correct
   c. is correct   d. a and b are correct
5. Which is not the oldest city among the following ones?
   a. Madurai
   b. Kancheepuram
   c. Poompuhar
   d. Chennai
6. Which city is related to Keezhadi excavation?
   a. Madurai
   b. Kancheepuram
   c. Poompuhar
   d. Harappa

II. Tick the appropriate answer. Match the Statement with the Reason

1. *Statement*: Goods were imported and exported from the city Poompuhar.

   Reason: Bay of Bengal was suitable for trading with neighbouring countries.
   a. Statement is correct, but reason is wrong.
   b. Statement and its reason are correct.
   c. Statement is wrong, but reason is correct.
   d. Both are wrong.
2. a. Thirunavukkarasar said "kalviyil karaiillatha". This statement refers to the city Kancheepuram.

   b. Hieun Tsang said, "Kancheepuram is one among the seven-sacred places of India".

   c. Kalidasa said, "Kancheepuram is the best city among the cities"

   a. only a is correct
   b. only b is correct
   c. only c is correct
   d. All are correct
3. Find out the correct statement
   a. Naalangadi - Night shop
   b. Allangdi - Day-time shop
   c. Ancient Roman coin factory was found at Poompuhar.
   d. Pearls were exported from Uvari near Korkai.

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4. Find out the wrong statement.
   a. Megasthanese has mentioned Madurai in his account.
   b. Hien Tsang came to the Tamil city of Kancheepuram.
   c. Kovalan and Kannagi lived in Kancheepuram.
   d. Iraq is mentioned in *Pattinapalai*.
5. Find out the correct pair
   a. Koodal Nagar - Poompuhar
   b. Thoonga Nagaram - Harappa
   c. City of Education - Madurai
   d. City of Temples -Kancheepuram
6. Find out the wrong pair
   a. Vadamalai - Gold
   b. Western Ghats - Sandal
   c. Southern Sea - Pearls
   d. Eastern Sea - Ahil

III. Fill in the blanks

1. Kanchi Kailasanathar temple was built by ________________________.
2. ________________ is known as the city of temples.
3. Masathuvan means ____________.

IV. State True or False

1. Cultural relationship with the outside world developed in Poompuhar because of its trade relationship with it.
2. Women also purchased from Allangadi of Madurai without fear.
3. Many rock cut temples were made during the Pallava period.
4. Bodhi Dharmar belonged to Kancheepuram.

V. Answer in one word

1. What do you know about the term 'export'?
2. Mention the epic and the sangam poem you read in this lesson.
3. Which is the oldest city in Thondai Nadu?
4. Point out any one difference between a village and a city.
5. Which civilisation is associated with the city Lothal?
6. Name the oldest civilization of the world

VI. Answer the following

1. Write a brief note on ancient cities of India.
2. Mention the ancient cities of Tamil Nadu.
3. Discuss the sources available to know about Tamil cities.
4. Write about the kings who ruled Madurai.
5. Mention the other names of Madurai.
6. What is the difference between Naalangadi and Allangadi.
7. Name the scholars who were born at Kancheepuram.
8. Which is known as city of lakes? Why?

VII. HOTS

1. Write a short note on Iraq.
2. Write a paragraph about the city Poompuhar with special reference to trade.
3. Write about the accounts given by scholars about Kanchi.
4. City of temples. Give short notes.
5. Kancheepuram was famous for education. Prove this statement.

VIII. Student Activity

1. Make an album about Keezhadi excavations.
2. Poompuhar was famous for trading activities. Discuss.
3. Collect the pictures of Pallava temple architecture.
4. Prepare a booklet describing the famous lakes of Tamil Nadu.
5. Make a booklet about the famous cities of Tamil Nadu.
6. Go to library and find out the places of importance in your district.

IX. Answer Grid

Poompuhar was located on which river bank? **Ans:**	Name the ancient city which had Tamil Sangam. **Ans:**	Name a Sangam literary work. **Ans:**
Which Greek historian gave accounts about the Pandya kingdom? **Ans:**	To which Tamil kingdom did the southern districts of Tamil Nadu belong to during the Sangam Age? **Ans:**	Name the Chinese traveller who stayed and studied in Nalanda University. **Ans:**
Thirunavukarasar mentioned Kanchi as ____________________. **Ans:**	What is the name of evening market during the Sangam Age? **Ans:**	Name the temple built by Pallava king Rajasimha at Kanchi. **Ans:**
Which district is known as the district of lakes? **Ans:**	What is trade? **Ans:**	Name a port located on the shore of Bay of Bengal. **Ans:**

X. Life Skill

1. Make a handout that shows the importance of the place where you live.

XI. Map Work

Mark the following places in a South India map.

a. Chennai
b. Madurai
c. Kancheepuram
d. Poompuhar
e. Arabian Sea
f. Bay of Bengal
g. Indian Ocean

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GEOGRAPHY

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Unit 1

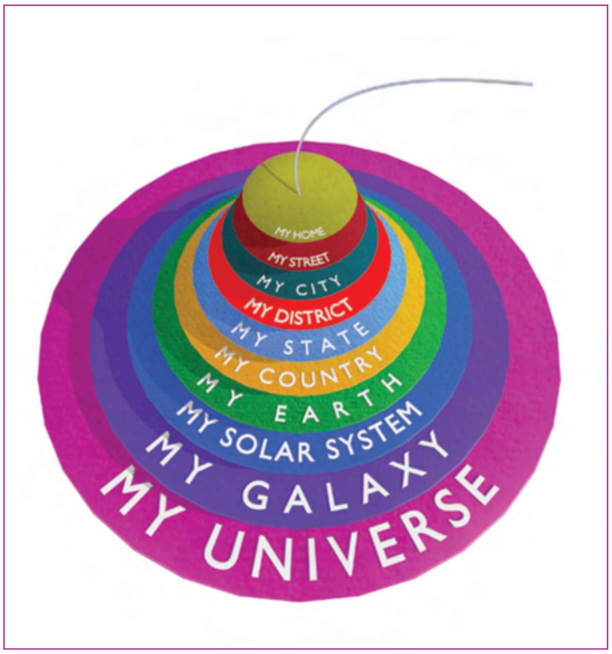
The Universe and Solar System

Learning Objectives

- To know about the formation of the universe
- To differentiate between the members of the Solar System
- To understand the motions of the Earth and its effects
- To learn about the different spheres of the Earth and their interaction with each other

Pathway:

This lesson focuses on the universe and the members of the solar system. It also deals with the motions of the Earth and their resultant effects. It also talks about the four spheres of the Earth.



Teacher : Students, do you all know where you reside?

Students : Yes, teacher.

Teacher : (Points out a student) Iniya, do you know your address? Can you tell me your full address?

Iniya : Yes teacher. My address is Iniya, 24, Bharathiar street, Thirunagar, Madurai - 625 006.

Teacher : Good. Iniya, where is Thirunagar?

Iniya : Thirunagar is in Madurai.

Teacher : Children, tell me where Madurai is?

Students : It is in Tamil Nadu.

Teacher : Good. Where is Tamil Nadu?

Students : In India ...teacher.

Teacher : Now tell me where India is?

Students : India is in the continent of Asia, teacher.

Teacher : Excellent! Can anyone tell me where is the continent of Asia?

Students: Yes teacher. It is on the Earth.

Teacher : Ok children, tell me where the Earth is located?

Students : (Remain silent and after sometime they reply in chorus) No. We don't know.

Teacher : Now, let me explain. The Earth is the third planet in the Solar System. The solar system is in the galaxy. It is named as the Milkyway Galaxy. There are millions of such galaxies in the Universe.

Iniya : Teacher, shall I say the address of our Earth?

Teacher : Address of our Earth? It's interesting Iniya. Tell us the address.

Iniya : Miss. Earth,
No.3. Solar System,
Milkyway Galaxy,
Universe.

(Everyone clapped and the teacher appreciates Iniya.)

Teacher : That was very good Iniya. Now let us know about the solar system, galaxy, the Universe and all other bodies in detail in this lesson.

Numerous stars and celestial bodies came into existence by a massive explosion called the **Big Bang**. These celestial bodies together are called the **Universe**. It is also referred to as the **Cosmos**. The stars that you see are so far away that they appear to be small, but they are really huge in size.

> **DO YOU KNOW?**
> The study of the Universe is called **Cosmology**. The term Cosmos is derived from the Greek word 'Kosmos'.

1. Universe

The Universe is a vast expanse of space. Most astronomers believe that the Universe came into existence after the Big Bang explosion that took place about 15 billion years ago. The universe consists of billions of galaxies, stars, planets, comets, asteroids, meteoroids and natural satellites. These are collectively called as celestial bodies, which are located far away from each other. A Light year is the unit used to measure the distance between the celestial bodies.

Galaxy

A galaxy is a huge cluster of stars which are held together by gravitational force. Most of the galaxies are scattered in space,

DO YOU KNOW?

A light-year is the distance travelled by light in a year. Light travels at a velocity of 300,000 km per second. Sound travels at a speed of 330 m per second.

but some remain in groups. The Milky Way Galaxy was formed about 5 billion years after the Big Bang explosion. Our solar system is a part of the Milky Way galaxy.

Galaxy

Andromeda galaxy is the nearest to the Earth apart from the 'Magellanic Clouds' galaxy.

2. The Solar System

The word 'solar' is derived from the Roman word '**sol**', which means 'Sun God'. The solar system is believed to have formed about 4.5 billion years ago. The solar system is a gravitationally bound system which comprises of the Sun, the eight planets, dwarf planets, satellites, comets, asteroids and meteoroids.

Activity:

Watch a show in the nearest planetarium. a) Share your experience in the class room. b) Make an album of interesting facts about the solar system.

The Sun

Sun

The Sun is at the centre of the solar system. Each member of the solar system revolves around the Sun. The Sun is so huge, that it accounts for 99.8 percent of the entire mass of the solar system. The Sun is made up of extremely hot gases like Hydrogen and Helium.

The Sun is a star. It is self-luminous; it gives light on its own. The surface temperature of the Sun is about 6,000° C. It is the source of light and heat energy to the entire solar system. Sunlight takes about 8.3 minutes to reach the Earth.

> **DO YOU KNOW?** 1.3 million Earths can fit inside the Sun. Imagine how big the Sun is.

Planets

The word 'planet' means **wanderer**. There are eight planets in the solar system. They are Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune. All the planets rotate anti-clockwise (from west to east) on their own axes except Venus and Uranus. The elliptical path in which the planets move around the Sun is known as orbit. The eight planets revolve in their respective orbits because of the gravitational pull of the Sun. They do not move out of their paths or away from the solar system.

> **GEO CONNECT:** The ancient Tamils knew that the planets revolved around the Sun. For example, in Tamil literature **Sirupanatruppadai**, the line 'வாள் நிற விசும்பின் கோள் மீன் சூழ்ந்த இளங்கதிர் ஞாயிறு' mentions that the Sun is surrounded by planets.

The four planets nearer to the Sun are called **Inner or Terrestrial Planets** (Mercury, Venus, Earth and Mars). The inner planets are comparatively smaller in size and are composed of rocks. The surface of inner planets has mountains, volcanoes and craters. The last four planets are called as **Outer Planets or Jovian Planets** (Jupiter, Saturn, Uranus, and Neptune). They are also called **Gaseous Giants**. An asteroid belt is found between Mars and Jupiter.

> **Mnemonic to remember the order of planets:** My Very Educated Mother Just Showed Us Neptune.

Mercury (The Nearest Planet)

Mercury

Mercury is the smallest and closest planet to the Sun. It is named after the Roman deity 'Mercury', the messenger to the Gods. It is an airless and waterless planet. It does not have an atmosphere and so experiences extremes of temperature. It has no natural satellites. Mercury can be viewed in the morning and evening with the naked eye.

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Venus (The Hottest Planet)

Venus

Venus is the second planet from the Sun. It is called the **Earth's twin**, as it is almost the same size as the Earth. It has the longest rotation period (243 days) among the planets in the Solar system. It rotates in the opposite direction to all other planets, except Uranus. It has no natural satellites, like Mercury. It is named after the Roman goddess of love and beauty. It is often visible in the mornings and the evenings and so it is frequently called as the **Morning Star** and the **Evening Star**. After the Moon, it is the brightest natural object in the night sky.

> **HOTS:** Even though Mercury is the nearest planet to the Sun, Venus is the hottest one. Guess why?

Earth (The Living Planet)

Earth

The Earth is the third planet from the Sun and the fifth largest planet in the solar system. It is called the 'blue planet' or 'watery planet' because three-fourth of the Earth is covered by water. The Earth is the only planet in the solar system which is not named after any Greek or Roman deity. It is the only planet known to support life. Life is possible on Earth because of the presence of land, air and water. The polar diameter of the Earth is 12,714 km and the equatorial diameter is 12,756 km. The Earth revolves around the Sun at a speed of about 30 km per second. The only natural satellite of the Earth is the Moon.

> **DO YOU KNOW?** The distance between the Sun and the Earth is about 150 million kilometre. A flight flying at a speed of 800 km per hour from the Earth would take 21 years to reach the Sun.

Mars (The Red Planet)

Mars

Mars is the fourth planet from the Sun and the second smallest planet in the solar system, after Mercury. It is named after the Roman God of war. It appears red in colour due to the presence of iron oxide on its surface. So, it is often described as the **Red Planet**. It has a thin atmosphere. It also has polar ice caps like the Earth.

> On 24th September, 2014 Mangalyan (Mars Orbiter Mission - MOM), launched by the Indian Space Research Organization (ISRO), reached the orbit of Mars to analyze its atmosphere and topography. ISRO has now become the fourth space agency to reach Mars after the Soviet Space programme, NASA and the European Space Agency.

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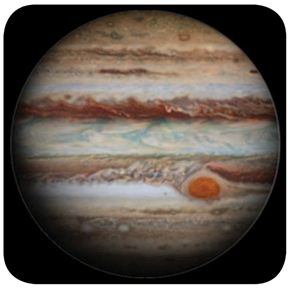
Mars has two natural satellites namely Phobos and Deimos. Many orbiters and rovers have been launched to explore this planet.

Jupiter (the Largest Planet)

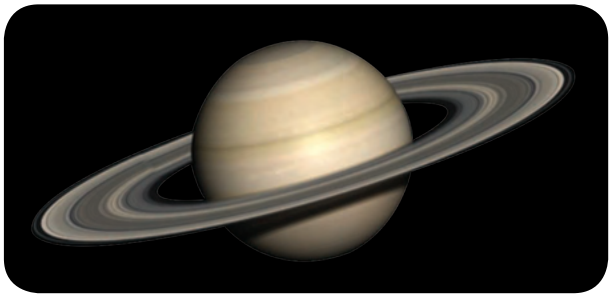


Jupiter

Jupiter is the fifth planet from the Sun and the largest planet in the solar system. It is named after the king of the Roman gods. It is the third brightest object in the night sky, after moon and Venus. It is the fastest spinning planet in the solar system. It is called a gas giant planet. Its atmosphere is mostly made up of Hydrogen and Helium like the Sun. It has the largest number of natural satellites. Io, Europa, Ganymede and Callisto are a few large satellites of Jupiter.

Saturn (The Ringed Planet)

Saturn is the sixth planet from the Sun and the second largest planet in the solar system, after Jupiter. It is named after the Roman god of agriculture. Saturn has many rings around it. These rings are huge and are mostly made up of ice, rocks and dust particles.



Saturn

Saturn has 62 natural satellites around it. Titan, Saturn's largest moon, is the only satellite in the solar system that has clouds and a dense atmosphere composed of nitrogen and methane. The specific gravity of Saturn is less than that of water.

HOTS: If you could put Saturn in a large enough ocean it would float. Guess why?

Uranus (The Somersaulting Planet)

Uranus

Uranus is the seventh planet from the Sun. It was the first to be discovered with a telescope by the astronomer William Herschel in 1781. It appears green due to the presence of methane gas. It is named after the Greek god of the sky. It rotates on its axis from east to west like Venus. Its axis is tilted so much that, it appears to orbit the Sun on its sides like a rolling ball. Uranus has 27 natural satellites, of which Titania is the largest.

Neptune (The Coldest Planet)

Neptune

Neptune is the eighth and the farthest planet from the Sun. There are strong winds in this planet. It is named after the Roman god of sea. Neptune has 14 natural satellites, the largest being Triton. Because of its distance from the Sun, Neptune is one of the coldest planets in the solar system.

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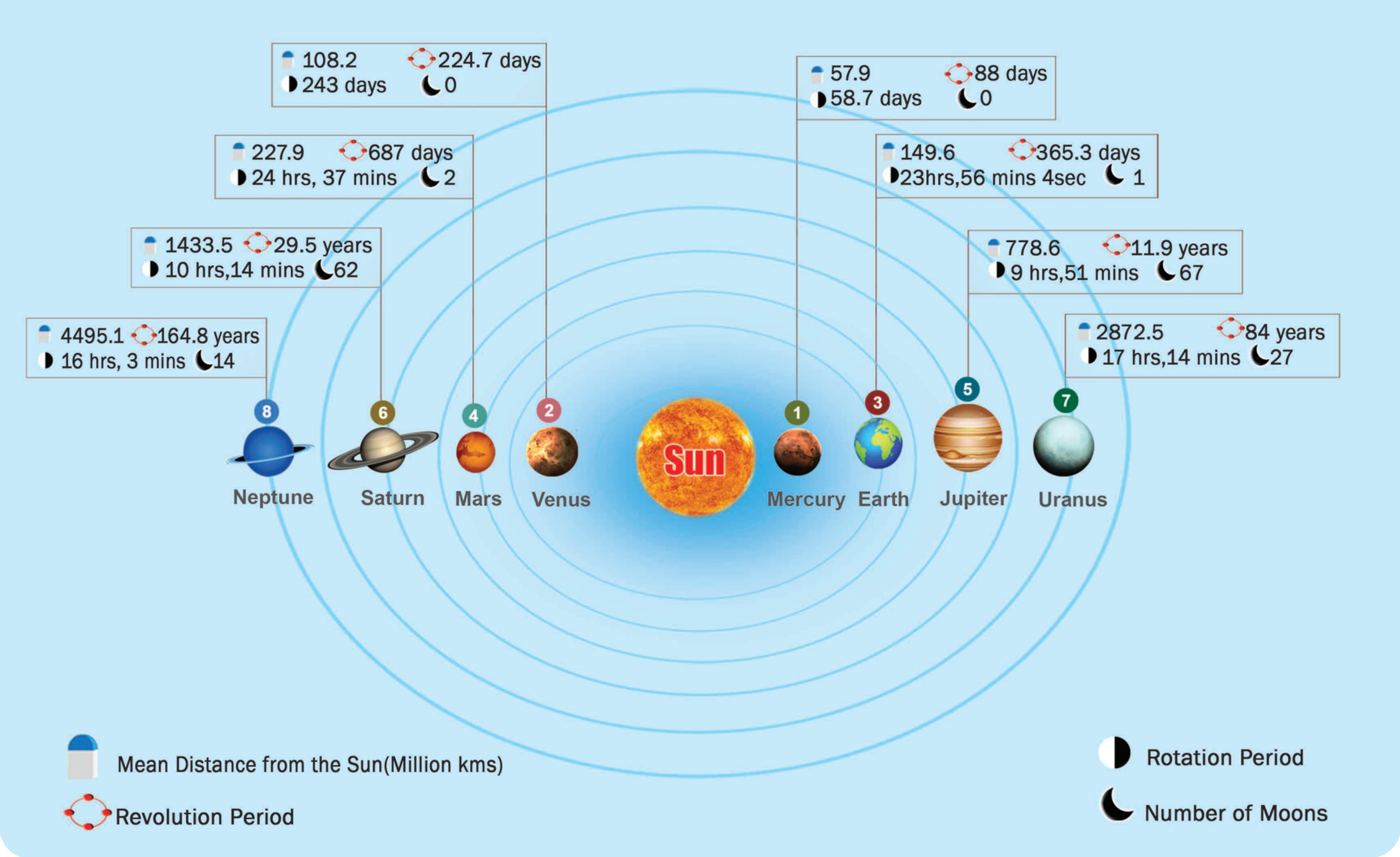
THE PLANETS AT A GLANCE



The striking blue and white features of Neptune help to distinguish it from Uranus.

HOTS: Imagine you were on a space craft travelling at the speed of light from Earth, how long would it take to reach the Sun?

The Dwarf Planets

Dwarf planets are small celestial bodies found beyond the planet Neptune. They are extremely cold and dark. They are almost spherical in shape, but unlike planets they can share their orbit with other dwarf planets. The five dwarf planets of the solar system are Pluto, Ceres, Eris, Makemake and Haumea.

The Moon - Earth's Satellite

Moon

Satellites are celestial objects, which revolve around the planets. The moon is the Earth's only satellite. It revolves around the Earth once in every 27 days and 8 hours. It takes about the same time for it to complete one rotation around its axis. It has no atmosphere. The surface of the moon is characterized by craters created by the impact of meteors. The distance between the moon and the Earth is about 3, 84,400 km. The size of the moon is one-quarter of the Earth. The Moon is the only celestial body where humans have landed.

HOTS: We see only one side of the Moon always. Why?

Asteroids

Asteroids are small solid objects that move around the Sun. They are found as a belt between Mars and Jupiter. They are too small to be called as planets. They are also known as **Planetoids** or **Minor Planets**.

Fact:

ISRO launched India's first ever Moon mission, **Chandrayaan - 1** in 2008.

Comets

A comet is a celestial object made up of a head and a tail. The head of a comet consists of solid particles held together by ice and the tail is made up of gases. Halley's Comet is the most famous comet which comes close to the Earth every 76 years. It appeared in 1986 and will appear in 2061.

Comets

Meteors and Meteorites

A meteor is a stone like or metallic body. When entering into the Earth's atmosphere, most of them burn. As they often appear as streaks of light in the sky, they are also known as **Shooting Stars**.

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Meteors which strike the Earth's surface are called meteorites.

3. Motions of the Earth

Have you noticed the Sun in the morning, afternoon or evening? Is it in the same place throughout the day? No. It is seen in the east in the morning, overhead in the afternoon and in the west in the evening. Have you ever thought of the reason behind it? This is because of the constant moving of the Earth around the Sun. It seems that the Sun is moving, but it is not so. This is similar to what you experience when you are travelling in a bus or train. When you look out of the window, the trees, lamp posts and other objects seem to be moving, but actually it is you who are moving. To understand the motions of the Earth better, you need to be familiar with the shape and inclination of the Earth.

Shape and Inclination of the Earth

The Earth is spherical in shape. It rotates on its axis, which is an imaginary line that runs from the North Pole to the South Pole passing through the centre of the Earth. The Earth's axis is always tilted or inclined from the vertical by an angle of 23½°. It makes an angle of 66½° with the plane of the Earth's orbit.

Fact:

The velocity of the Earth's rotation varies from 1,670 km per hour at the equator to 845 km per hour at 60° N and S latitudes and zero at the poles.

Rotation

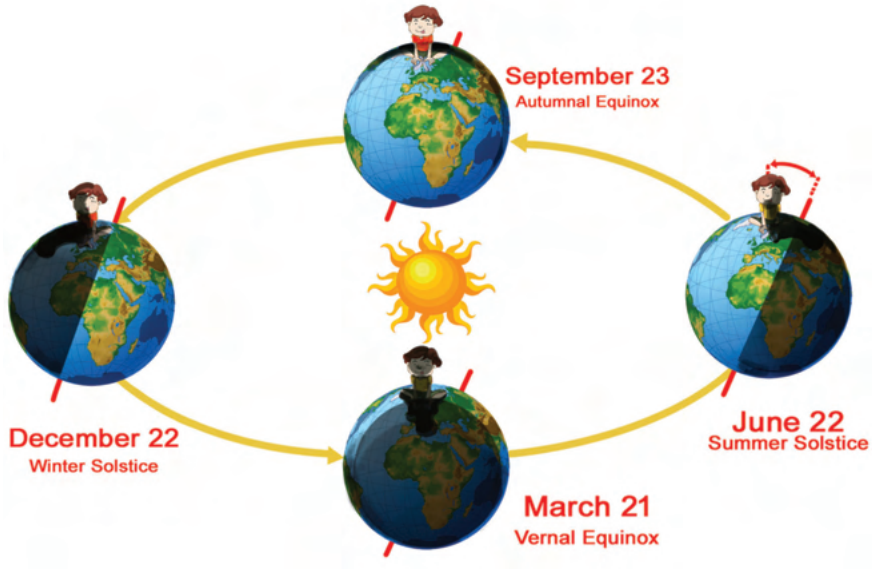
It is the spinning movement of the Earth on its axis. The Earth rotates from west to east (anti-clockwise) and takes 23 hours 56 minutes and 4.09 seconds to complete one rotation. The time taken by the Earth to complete one rotation is called a day. The rotation of the Earth causes day and night. As the Earth is spherical in shape, only one half of it is illuminated by the Sun at a time. The other half remains dark. The illuminated portion of the Earth experiences day, whereas the darkened part of the Earth experiences night. The line which divides the surface of the Earth into a lighted half and a dark half is called the **Terminator Line**.

Fact:

The **Midnight Sun** is a natural phenomenon that occurs in the summer months in places north of the Arctic Circle or south of the Antarctic Circle, when the Sun remains overhead 24 hours a day.

Revolution

It is the movement of the Earth around the Sun on its elliptical path. The Earth takes 365 ¼ days to complete one revolution. It revolves around the Sun at a speed of 30 km per second. For the sake of convenience, we take it as 365 days and



call it a year. The remaining quarter day is added once in every four years in the month of February. That is why February has 29 days once in four years. It is called a **Leap Year**. The inclination of the Earth on its axis and its revolution around the Sun cause different seasons.

Activity:

Circle the leap years: 2000, 2005, 2012, 2014, 2017, and 2020

The Northern Hemisphere is inclined towards the Sun for six months from 21st March to 23rd September while the Southern Hemisphere is tilted away from the Sun.

HOTS: Priya is 12 years old. How many times she would have revolved around the Sun?

From Sep 23rd to March 21st the southern hemisphere is inclined towards the Sun and the northern hemisphere faces away from the Sun. The changing position of the Earth in its orbit during revolution gives the impression that the Sun is continuously moving north and south of the equator. The equator faces the Sun directly on 21 March and 23 September. These two days are called **Equinoxes**, during which the day and night are equal throughout the Earth.

DO YOU KNOW?

Perihelion is the Earth's closest position to the Sun. **Aphelion** is the farthest position of the Earth from the Sun.

On 21st June, the Tropic of Cancer faces the Sun. This is known as **Summer Solstice**. It is the longest day in the Northern Hemisphere and longest night (shortest day) in the Southern Hemisphere. On 22nd December, the Tropic of Capricorn faces the Sun. It is called as **Winter Solstice**. It is the longest day in the Southern Hemisphere and longest night (shortest day) in the Northern Hemisphere.

HOTS: If the Earth is not inclined at 23½° angle, what would happen to the Earth?

4. Spheres of the Earth

The Earth is the most suitable planet to support life. It has three major components that we call as the realms of the Earth- lithosphere, hydrosphere and atmosphere. The three components along with suitable climate make life possible on Earth. All living things exist in a narrow zone called the biosphere. Now let us have a close look at each of the spheres.

Lithosphere

The word lithosphere is derived from the Greek word **Lithos**, which means rocky. The Lithosphere is the land on which we live. It is the solid outer layer of the Earth consisting of rocks and soil.

Hydrosphere

The word **Hydro** means water in Greek. The hydrosphere consists of water bodies such as oceans, seas, rivers, lakes, ice caps on mountains and water vapour in the atmosphere.

Atmosphere

The word **Atmo** means air in Greek. Atmosphere is the envelope of air that surrounds the Earth. Different types of gases make up the atmosphere. The major gases are Nitrogen (78%) and Oxygen (21%). The other gases like Carbon dioxide, Hydrogen, Helium, Argon and Ozone are present in meager amounts.

Biosphere

The narrow belt of interaction among the lithosphere, the hydrosphere and the atmosphere, where life exists is known as Biosphere. **Bio** means life in Greek. It consists of distinct zones. Each zone has its own climate, plant and animal life. These zones are known as ecosystems.

DO YOU KNOW? The Gulf of Mannar Biosphere Reserve in the Indian Ocean covers an area of 10,500 sq.km in the ocean.

Summary

- The Universe was formed 15 billion years after the Big Bang explosion
- Many galaxies are found in the Universe.
- Our solar system is a part of the Milky Way Galaxy.
- The Sun is so huge that it accounts for 99.8 percent of the entire mass of the solar system.
- All planets rotate anti-clockwise on their own axes except Venus and Uranus.
- Asteroids are found as a belt between Mars and Jupiter.
- The rotation of the Earth causes day and night.
- The revolution of the Earth causes seasons.
- Summer solstice is the longest day in the Northern Hemisphere.
- The presence of land, water and air along with suitable climate makes life possible on Earth.

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GLOSSARY

1.	Galaxy	-	The cluster of stars
2.	Asteroids	-	Irregular shaped rocks between Mars and Jupiter
3.	Meteors	-	Space particles left behind by comets or asteroids
4.	Comets	-	Frozen lumps of rocks, dust and gas.
5.	Satellites	-	Celestial bodies that move around the planets.
6.	Orbit	-	The path in which the planets move around the Sun.
7.	Earth's axis	-	An imaginary line passing through the centre of the Earth from the North Pole to the South Pole.
8.	Rotation	-	Spinning movement of the planets on their axes.
9.	Revolution	-	The movement of the planets around the Sun in their orbit.
10.	Equinox	-	The day on which day and night are of equal length.
11.	Solstice	-	An occurrence when the Tropic of Cancer and Tropic of Capricorn face the Sun vertically.
12.	Rover	-	A space exploration vehicle which moves across the surface of a celestial body
13.	Orbiter	-	A spacecraft which orbits a celestial body without landing on its surface.

Exercises

A. Fill in the blanks

1. The Universe was formed after ________________ explosion.
2. _________________ is the unit used to measure the distance between two celestial bodies.
3. ________________ is the centre of the solar system.
4. The word planet means _________.
5. ________________ planet has many natural satellites.
6. India's first ever mission to the moon is ________________.
7. Earth is inclined by ____ degrees.
8. The Equator faces the Sun directly on __________ and __________ .
9. At the time of Perihelion, the Earth is ____________________ to the Sun.
10. The line which divides day and night on the Earth's surface is __________ .

B. Choose the best answer

1. The movement of the Earth on its axis is called
   a. Revolution b. Seasons
   c. Rotation d. Circulation
2. The Tropic of Capricorn faces the Sun directly on
   a. March 21 b. June 21
   c. September 23 d. December 22
3. The galaxy in which our solar system is found is
   a. Andromeda
   b. Magellanic clouds
   c. Milky Way
   d. Starburst

4. The only celestial body where man has successfully landed

    a. Mars b. Moon

    c. Mercury d. Venus

5. Which of the following planets can float on water?

    a. Jupiter b. Saturn

    c. Uranus d. Neptune

C. Circle the odd one out

1. Venus, Jupiter, Neptune, Saturn
2. Sirius, Andromeda, Milky way, Magellanic clouds
3. Pluto, Eris, Ceres, Io
4. Comet, Asteroids, Meteorites, Dwarf planets
5. Rover, Orbiter, Aeroplane, Space shuttle

D. Match the following

1. Hottest Planet	-	a. Mars
2. Ringed Planet	-	b. Neptune
3. Red Planet	-	c. Venus
4. Somersaulting Planet	-	d. Saturn
5. Coldest Planet	-	e. Uranus

E. i) Consider the following statements

1. Venus rotates from east to west.
2. The Tropic of Cancer faces the Sun on June 21.
3. Mars has rings around it.

Choose the correct answer using the codes given below.

    a. 1 and 2 b. 2 and 3

    c. 1, 2 and 3 d. 2 only

ii) Which of the statement(s) is/are true?

Statement I: Earth is called a watery planet.

Statement II: The rotation of the Earth causes seasons.

a. I is true; II is wrong

b. I is wrong; II is true

c. Both the statements are true

d. Statements I and II are wrong.

F. Name the following

1. Cluster of stars.
2. The nearest galaxy to the solar system.
3. The brightest planet.
4. The living sphere.
5. The year which has 366 days.

G. Answer in brief

1. Name the inner planets.
2. Pluto is no longer a planet. Reason out.
3. What is perihelion?
4. How many times in a year would you find the Sun overhead if you lived on 20°N Latitude?
5. Which celestial body shares its orbit with others? Give an example.

H. Give reasons

1. Why is Uranus called the somersaulting planet?
2. The surface of the moon has many craters.
3. The velocity of the Earth's rotation is zero at poles.

I. Answer in detail

1. Distinguish between inner and outer planets.
2. What are the effects of rotation and revolution?
3. Explain the characteristics of the various spheres of the Earth.

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J. Picture Study

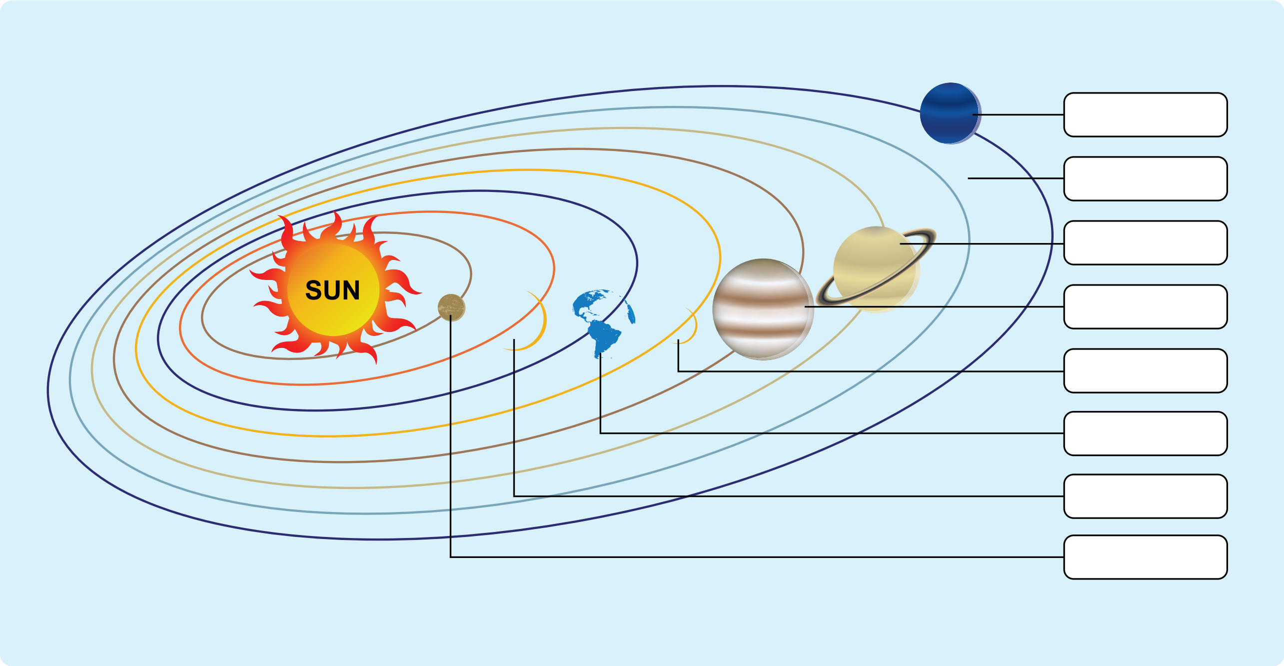
1. Study the picture and answer the given questions.

a. Which is the closest planet to the Sun?

b. Which is the largest planet?

c. Which is the farthest planet from the Sun?

d. Which is the second smallest planet?



2. Look at the picture and answer the questions given below.

a) Identify the planet

----

b) What is the colour of the planet?

----

c) Why is it of this colour?

STUDENT ACTIVITY

K. Solve the puzzle

Across

2 A dwarf planet.

3 Equal days and nights.

7 I am a gas found in the Sun.

8 I appear once in 76 years.

Down

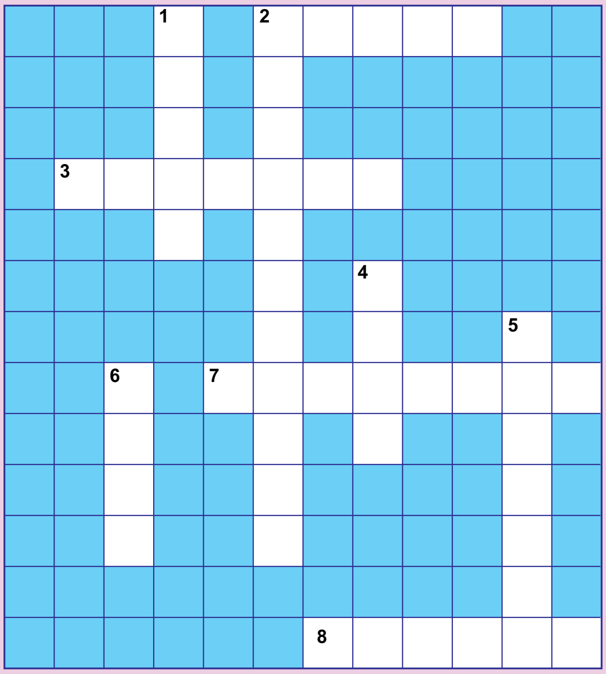
1 I am the morning star.

2 India's first moon mission.

4 I have two natural satellites.

5 I am the farthest planet.

6 An imaginary line passing through the centre of the Earth.



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Internet Resources

1. www.nationalgeographic.org/encylopedia/seasons
2. www.slideshare.net
3. www.britannica.com
4. www.geography4kids.com
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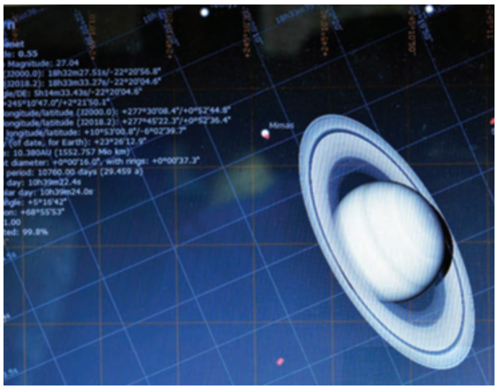
ICT CORNER

Explore the Solar System!

Travel to the planets and stars and enjoy the adventure!

Lets explore universe on Stellarium



Step 1:

Download and install the 'Stellarium' app from the given link. Double click and open the "Stellarium" app

Step 2:

Click the "Location window" or F6. Then select your location using drop down boxes and view the placements of celestial bodies in the sky.

Step 3:

Click the "Date/Time window" or F5. Then set the date and time zone of your location.

Step 4:

Use the "Search window" or F3 and type any name of the solar system to explore them.Select and zoom in on the Earth and play with increase or decrease speed buttons to view its rotation.

Image 1

Image 2

Image 3

Image 4

URL to download Stellarium app:

http://stellarium.org/

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Unit 2

Land and Oceans

Learning Objectives

- To understand the continents and oceans
- To learn about the characteristic features of different landforms and oceans
- To know about the classification of landforms
- To understand the oceans and its features

Pathway

This lesson focuses on the land and oceans found on Earth. It deals with the classification of landforms - first, second and third order landforms.

The teacher enters the classroom with giant-sized envelopes. The students are enthusiastic to know about the content of the envelopes. The teacher asks the children to sit in groups and explains the activity. Each group is given an envelope which contains seven jig-saws and a chart paper. The teacher asks them to paste the jig-saws (continents) close to each other leaving no gap between them. The teacher asks them to colour the remaining places in blue.

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A group pastes the continents and comes first with the chart without any gaps in between the continents. The teacher then puts the chart on the board and the children applaud.

"What kind of picture is this? Once I have seen one like this in the atlas, " says Yazhini.

"You are right. This is **Pangea**, the Super Continent, and the Sea around is **Panthalasa**. It was 200 million years ago, when these landmasses moved away from each other to gain the present position as continents and oceans." says the teacher.

"What makes it to move madam?" asks Nila.

"Nothing other than the internal heat of the Earth," says the teacher and continues, "this lesson deals about the continents and oceans in detail".

The Earth is covered by **water** which occupies **71** percent and **land** that occupies **29** percent of the Earth's surface. The surface of the Earth is not even, because it has lofty mountains, deep oceans and other landforms. These landforms can be classified as:

1. First order landforms

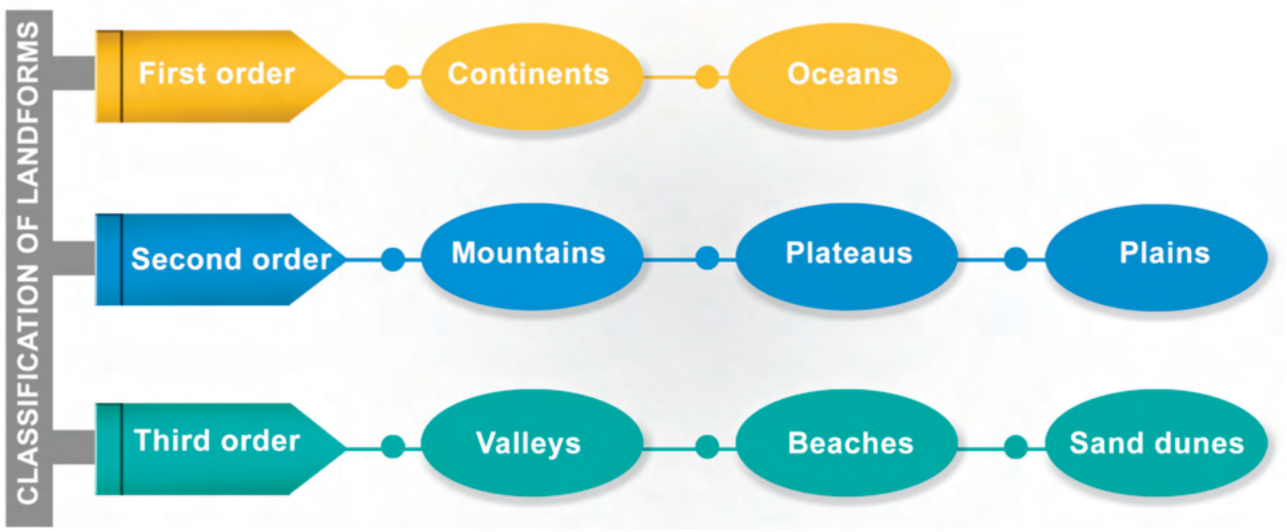
Continents and oceans are grouped as first order landforms. The vast land masses on Earth are called **Continents** and huge water bodies are called **Oceans.** There are seven continents. They are **Asia, Africa, North America, South America, Antarctica, Europe and Australia**. Asia is the largest continent, whereas Australia is the smallest one.

GEO CONNECT:

Land classification - Sangam period

1. **Kurinji** - Mountain and its environs
2. **Mullai** - Forest and its surroundings
3. **Marutham** - Agricultural land and its adjoining areas.
4. **Neithal** - Sea and its environs
5. **Palai** - Desert region

Which of the above landform category do you belong to?



Classification of landforms

Apart from continents, there are five oceans located on the Earth's surface. They are the **Pacific, Atlantic, Indian, Southern and Arctic Oceans**. Among these oceans, the Pacific Ocean is the largest and the Arctic Ocean is the smallest.

Activity:

Required materials

- A circular plate
- 7 slices of a carrot
- A glass of water

Procedure

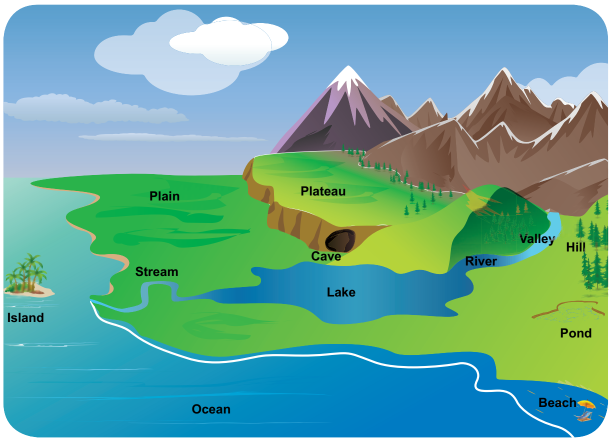
- Write the abbreviations As, Af, NA, SA, An, Eu and Au on each slice in descending order of its size.
- The teacher hangs a wall map of the world.
- The students have the expansion of each abbreviation written on the board.
- Students now try to place the slices on the plate matching the position of the continents in the world map.
- They pour some water.
- The teacher shows the oceans in the world map.
- Accordingly the students put their fingers in the respective places and repeat the names of the ocean stirring the water.
- The students learn the position, comparative size of the continent and the position of oceans.

DO YOU KNOW?

Isthmus : A narrow strip of land which connects two large landmasses or separates two large waterbodies.

2. Second order landforms

The second order landforms are categorised as mountains, plateaus and plains.



Second order Landforms: Mountains, Plateaus and Plains

2.1 Mountains

A landform that rises 600 metre above its surroundings and has steep slopes is called a **mountain**. Mountains are found in isolation or in groups. If the mountains extend for a larger area continuously, it is called a mountain range. These ranges stretch for hundreds or thousands of kilometre. The **Himalayas** of Asia, the **Rocky** Mountains of North America and

HOTS

December 11 - International Mountain Day

Prepare slogans, posters and placards to celebrate International Mountain Day.

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Activity:

Complete the given table with the help of an atlas. Follow the example.

S. No.	Mountain Ranges	Peaks	Continents	Elevation (m)
1.	The Himalayas	Everest	Asia	8,848
2.	The Rockies			
3.	The Andes			
4.	The Alps			
5.	The Eastern Ghats			

the **Andes** of South America are such examples. The Andes mountain in South America is the longest mountain range (7,000 km) in the world. The highest point of a mountain is known as its **peak**. Mt. Everest is the highest peak (8,848 m) in the world. Which country is Mt. Everest located in?

HOTS: You know the importance of conservation of forests. Do you think conservation of mountains is also equally important?

Mountains are the sources of rivers. They provide shelter to flora and fauna. Here, tourism is an important activity. During summer, people go to mountain regions to enjoy the pleasing cool weather. Udhagamandalam, Kodaikanal, Kolli hills, Yercaud and Yelagiri are some of the hill stations found in Tamil Nadu.

2.2 Plateaus

Plateaus are the elevated portions of the Earth that have flat surfaces bounded by steep slopes. The elevation of plateaus may be a few hundred or several thousand metres. **Tibetan Plateau** is the highest plateau in the world. So, it is called as the '**Roof of the world'**. The flat topped part of the plateau is called **Tableland**. The plateaus are generally rich in minerals. The **Chotanagpur Plateau** is one of the mineral rich plateaus in India. Therefore, mining is one of the major activities of the people living here. The **Deccan Plateau** in peninsular India is of volcanic origin.

DO YOU KNOW?

Dharmapuri Plateau, Coimbatore Plateau and Madurai Plateau are found in Tamil Nadu.

2.3 Plains

Plains are flat and relatively low-lying lands. Plains are usually less than 200 metre above sea level. Sometimes they may be rolling or undulating. Most plains are formed by rivers and their tributaries and distributaries. These plains are used extensively for agriculture due to the availability of water and fertile soil.

DO YOU KNOW?

The plains have been the cradle of civilisations from the earliest times. For example: the Indus in India, the Nile valley in Egypt are some of the early civilisations which developed and flourished.

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They are most suitable for human inhabitation. Hence, they are the highly populated regions of the world. The oldest civilisations like the Mesopotamian and the Indus civilisations developed in river plains. The Indo-Gangetic plain in North India is one of the largest plains in the world. The plains formed by river Cauvery and Vaigai are important plains found in Tamil Nadu. Coastal plains are the low lying lands adjacent to oceans and seas.

Activity:

Complete the given table with the help of an atlas. Follow the example.

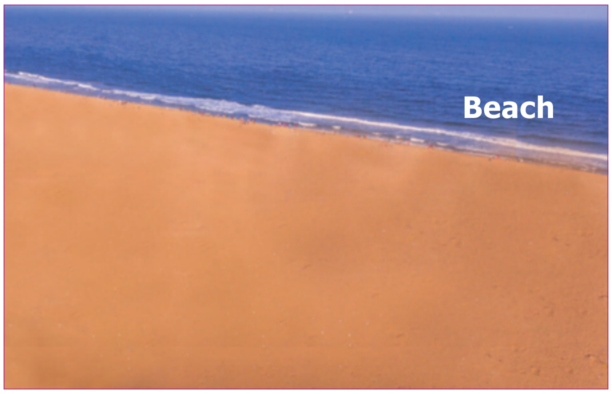
S.No.	Continents	Plateaus	Plains
1.	Asia	Tibetan Plateau	Yangtze Plain
2.	North America		
3.	South America		
4.	Australia		
5.	Europe		
6.	Africa		

Activity:

- Make a model of different landforms.
- Prepare an album of people's activities in different landforms.

3. Third order landforms

Third order landforms are formed on mountains, plateaus and plains mainly by erosional and depositional activities of rivers, glaciers, winds and waves. Valleys, beaches and sand dunes are some examples of third order landforms.

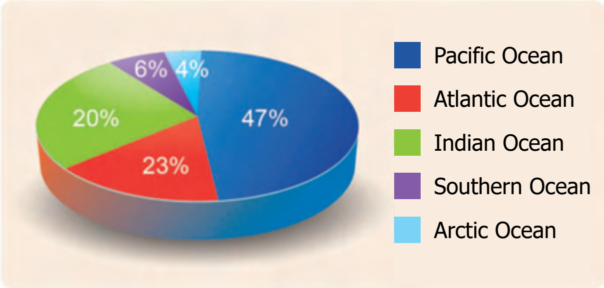


Erosion is the process of removal of surface material from the Earth's crust. The eroded materials are transported and deposited on the low lying areas. This process is called as **Deposition**.

HOTS: When you are walking on the Marina beach in Chennai, which order of landform are you on?

4. Oceans

The Earth looks blue when we see it from space. This is because, two-thirds of it is covered by water. The water is found in oceans and seas. Oceans are vast expanse of water. Seas are water bodies partially or fully enclosed by land. As you have studied previously, there are five main oceans in the world.



Area of Oceans (%)

4.1 The Pacific Ocean

The Pacific Ocean is the **largest and deepest ocean** on the Earth. It covers about one-third of the Earth's total area and spreads for about 168.72 million sq.km**.** It is bounded by Asia and Australia in its west and North America and South America in its east. It stretches from the Arctic Ocean in the north to the Southern Ocean in the south.

Pacific Ocean and its Marginal Seas

> **Do You Know?**
>
> If **Mount Everest**, which is the highest peak (8,848 metres) was placed into the **Mariana Trench**, still there would be 2,146 metres of water left.
>
> The depth in metres from the Mean Sea Level is denoted as **m$^-$**.

This ocean's shape is roughly triangular with its apex in the north at the Bering Strait which connects the Pacific Ocean with the Arctic Ocean. The Bering Sea, the China Sea, the Sea of Japan, Tasman Sea and the Philippine Sea are some of the marginal seas of the Pacific Ocean. Indonesia, Philippines, Japan, Hawaii, New Zealand are some of the islands located in this Ocean. The deepest point **Mariana Trench** is 10,994 m$^-$ and is located in the Pacific Ocean. A chain of volcanoes is located around the Pacific Ocean called the **Pacific Ring of Fire.**

> **Do You Know?**
>
> The Spanish navigator **Ferdinand Magellan** named the ocean **Pacific**, meaning calm or tranquil.

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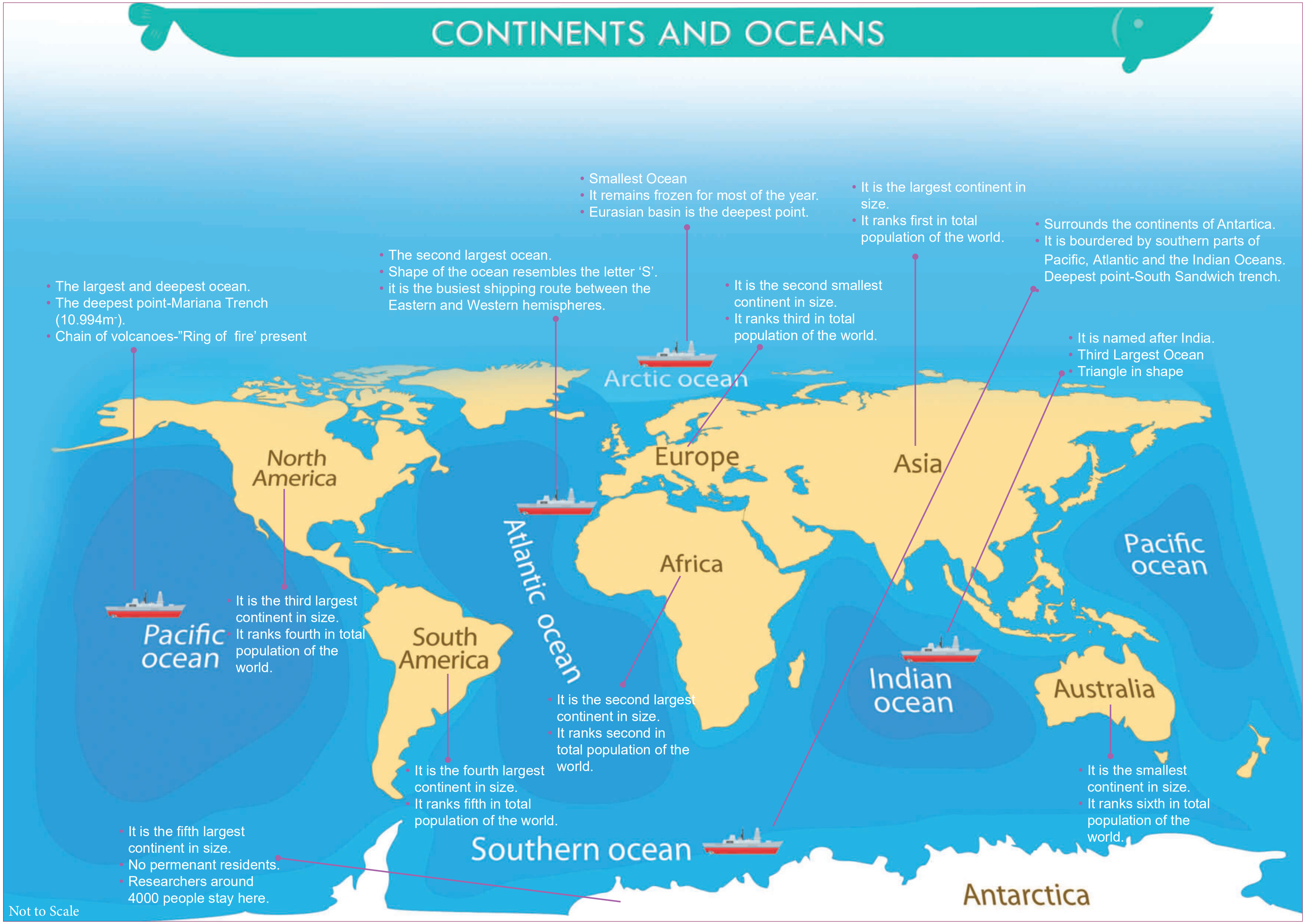

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4.2 The Atlantic Ocean

The Atlantic Ocean is the second largest ocean on Earth. It covers one sixth of the Earth's total area and spreads for about 85.13 million sq.km . It is bounded by North America and South America in the west and Europe and Africa in the east. Like the Pacific, it stretches from the Arctic Ocean in the north to the Southern Ocean in the south. The shape of the Atlantic Ocean resembles the letter **'S'**. The Strait of Gibraltar connects the Atlantic Ocean with the Mediterranean Sea. The Atlantic Ocean is the busiest

Atlantic Ocean and its Marginal Seas

shipping route between the Eastern and Western hemispheres. The deepest point is the **Milwaukee Deep** in the **Puerto Rica Trench**. It has a depth of about 8600 m. The Caribbean Sea, the Gulf of Mexico, the North Sea, the Gulf of Guinea and the Mediterranean Sea are important marginal seas of the Atlantic Ocean. St. Helena, Newfoundland, Iceland and Falkland are some of the islands found in this ocean.

> **HOTS:** Why are the Red Sea, Dead Sea and Black Sea named so?

4.3 The Indian Ocean

The Indian Ocean is the third largest ocean on the Earth's surface. It covers an area of about 70.56 million sq.km. It is named after India. It is triangular in shape and bounded by Africa in the west, Asia in the north and Australia in the east. The Andaman and Nicobar Islands, Lakshadweep, Maldives, Sri Lanka, Mauritius and the Reunion Islands are some of the islands located in the Indian Ocean. Malacca strait connects the Indian Ocean and the Pacific Ocean.

> **Palk Strait** connects the Bay of Bengal and Palk Bay.

The Bay of Bengal, the Arabian Sea, the Persian Gulf and the Red Sea are some of the important marginal seas of the Indian Ocean. The **Java trench** (7,725 m) is the deepest point in the Indian Ocean.

Indian Ocean and its Marginal Seas

DO YOU KNOW?

- 6° Channel separates Indira Point and Indonesia
- 8° Channel separates Maldives and Minicoy islands
- 9° Channel separates Lakshadweep Islands and Minicoy islands
- 10° Channel separates Andaman and Nicobar Islands

4.4 The Southern Ocean

The Southern Ocean surrounds the continent of Antarctica and is enclosed by the 60°S latitude. It covers an area of 21.96 million sq.km. It is bordered by the southern parts of the Pacific, the Atlantic and the Indian Oceans. The Ross Sea, the Weddell Sea and the Davis Sea are the marginal seas of this Ocean. Farewell Island, Bowman Island and Hearst Island are some of the islands located in this ocean. The water in this ocean is very cold. Much of it is covered by sea ice. The deepest point in this ocean is **South Sandwich Trench** with a depth of 7,235 m.

4.5 The Arctic Ocean

HOTS: When you travel from Japan to California, which ocean would you travel across?

The Arctic Ocean is the smallest ocean. It covers an area of 15.56 million sq.km. It lies within the Arctic Circle. It remains frozen for most of the year. The Norwegian Sea, the Greenland Sea, the East Siberian Sea and the Barents Sea are some of the marginal seas of this ocean. Greenland, New Siberian Island and Novaya Zemlya Island are some of the islands located in the Arctic Ocean. The North Pole is situated in the middle of the Arctic Ocean. The **Eurasian Basin** is the deepest point in the Arctic Ocean, which is about 5,449 m in depth.

Southern Ocean and its Marginal Seas

Arctic Ocean and its Marginal Seas

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Activity:

Complete the given table with the help of an atlas. Follow the example.

Sl.No.	Name of the Ocean	Area (million sq.km)	Trenches	Depth (m)
1.	Pacific Ocean	168.72	Mariana	10,994
2.	Atlantic Ocean			
3.	Indian Ocean			
4.	Southern Ocean			
5.	Arctic Ocean			

HOTS: When you arrange the continents in ascenWWding order according to their size, which ranks third?

Summary

- The surface of the Earth is covered by 71 percent of water and 29 percent of land.
- The landforms are classified as first order, second order and third order landforms.
- Continents and oceans are the first order landforms.
- There are seven continents and five oceans on the Earth's surface.
- Mountains, plateaus and plains are the second order landforms.
- Valleys, beaches and sand dunes are the third order landforms.
- Many islands and marginal seas are found in the oceans.

A-Z GLOSSARY

1. Island	-	A land surrounded by water on all sides.
2. Bay	-	A broad inlet of the sea where the land curves inwards.
3. Strait	-	A narrow stretch of water linking two large water bodies.
4. Trench	-	The deepest part of the ocean.
5. Peninsula	-	The land surrounded by water on three sides.

Exercises

A. Choose the correct answer

1. Which of the following is the smallest ocean on Earth?
   a. The Pacific Ocean
   b. The Indian Ocean
   c. The Atlantic Ocean
   d. The Arctic Ocean

2. The Malacca Strait connects
   a. The Pacific and Atlantic Oceans
   b. The Pacific and Southern Oceans
   c. The Pacific and Indian Oceans
   d. The Pacific and Arctic Oceans

3. Which of the following oceans is the busiest ocean?
   a. The Pacific Ocean
   b. The Atlantic Ocean
   c. The Indian Ocean
   d. The Arctic Ocean
4. The frozen continent is
   a. North America b. Australia
   c. Antarctica d. Asia
5. A narrow strip of water that connects two large water bodies
   a. A Strait b. An Isthmus
   c. An Island d. A Trench

B. Fill in the blanks

1. The world's largest continent is ______.
2. __________ is the mineral rich plateau in India.
3. The largest ocean is ________________.
4. Deltas are ________ order landforms.
5. The Island continent is ____________.

C. Circle the odd one out

1. Africa, Europe, Australia, Sri Lanka
2. The Arctic Ocean, the Mediterranean Sea, the Indian Ocean, the Atlantic Ocean
3. Plateau, Valley, Plain, Mountain
4. The Bay of Bengal, the Bering Sea, the China Sea, the Tasman Sea.
5. The Andes, the Rockies, the Everest, the Himalayas

D. Match the following

A		B
1. The South Sandwich Trench	-	a) The Atlantic Ocean
2. The Milwaukee Trench	-	b) The Southern Ocean
3. The Mariana Trench	-	c) The Indian Ocean
4. The Eurasian basin	-	d) The Pacific Ocean
5. The Java Trench	-	e) The Arctic Ocean

E. i) Consider the following statements

1. Plains are formed by rivers.
2. The 'South Sandwich Trench' is found in the Indian Ocean.
3. Plateaus have steep slopes.

Choose the correct answer using the codes given below.

a. 1 and 3 b. 2 and 3
c. 1, 2 and 3 d. 2 only

ii) Which of the following statement (s) is/are true?

Statement I: Mountains are second order landforms.

Statement II: The Mariana Trench is the deepest trench in the world.

a. I is true; II is wrong
b. I is wrong; II is true
c. Both the statements are true
d. Statements I and II are wrong.

F. Answer in a word

1. Which is the highest plateau in the world?
2. Name a second order landform.

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3. Which ocean is named after a country?
4. Name the island located in the Arabian Sea.
5. What is the deepest part of the ocean called as?

G. Answer in brief

1. What is a continent?
2. Name the continents which surround the Atlantic Ocean.
3. What are oceans?
4. List out the names of continents according to their size.
5. Name the oceans which surround North America and South America.

H. Distinguish between

1. A Mountain and a Plateau
2. An ocean and a sea

I. Answer the following questions in detail

1. Mention the classification of land forms.
2. Write a note on plateaus.
3. Plains are highly populated. Give reasons
4. Give the important features of the Pacific Ocean.
5. Write about the importance of oceans.

J. Picture Study

1. Name the landform.
2. What order of a landform is this?
3. By which activity of river is this landform formed?

K. i) Activity

1. Trip to the nearby area to appreciate the physical features of any kind of landform.
2. Conduct a quiz on landforms and oceans.

ii) Activity

1. Give examples for the following using an Atlas.

   a. Bay: _______, _______, _______

   b. Gulf: _______, _______, _______

   c. Island: _______, _______, _______

   d. Strait: _______, _______, ______

2. Map reading (with the help of an atlas)

   a. A sea in the east of India

   b. Continents in the west of Atlantic Ocean

   c. Continents in the south of Arctic Ocean

   d. A strait between India and Sri Lanka

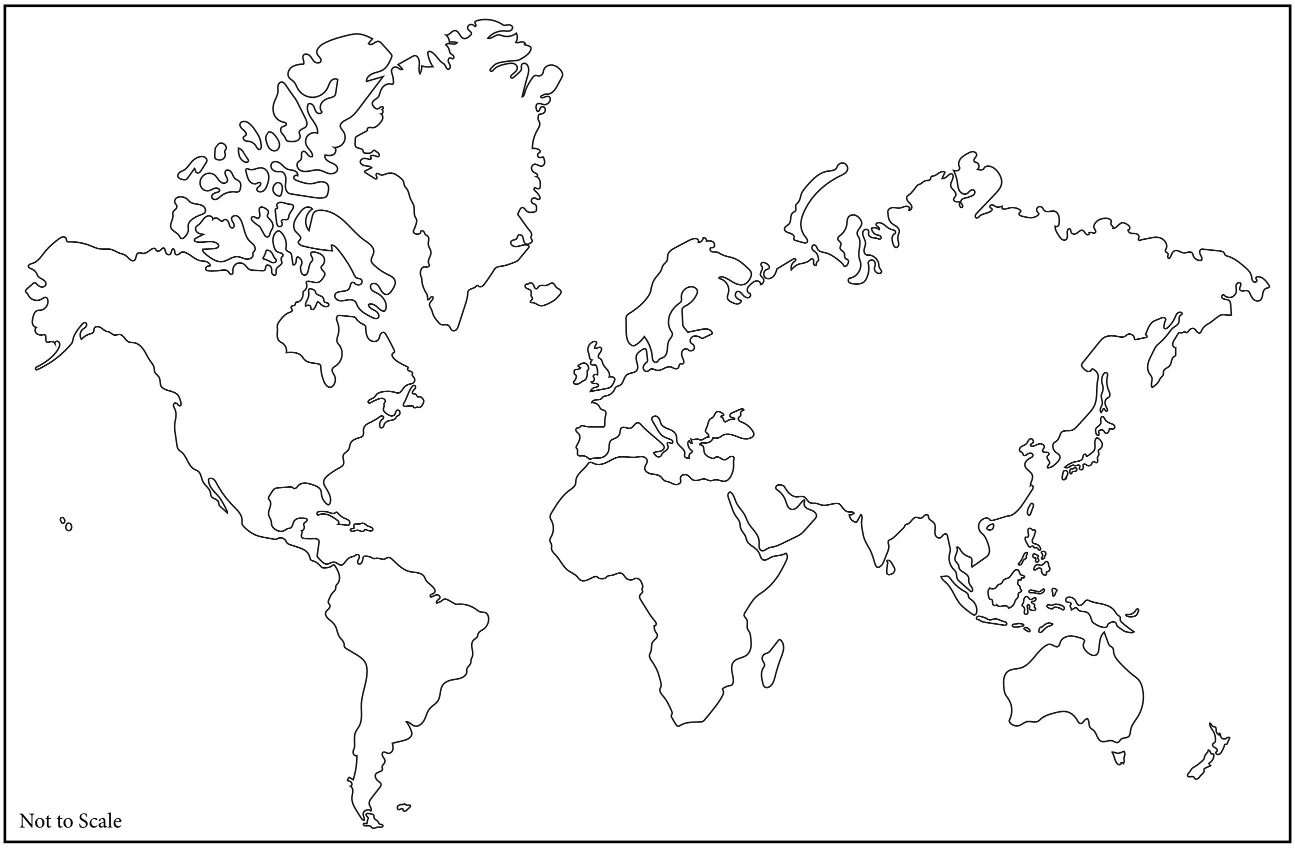
   e. Oceans which surround Australia

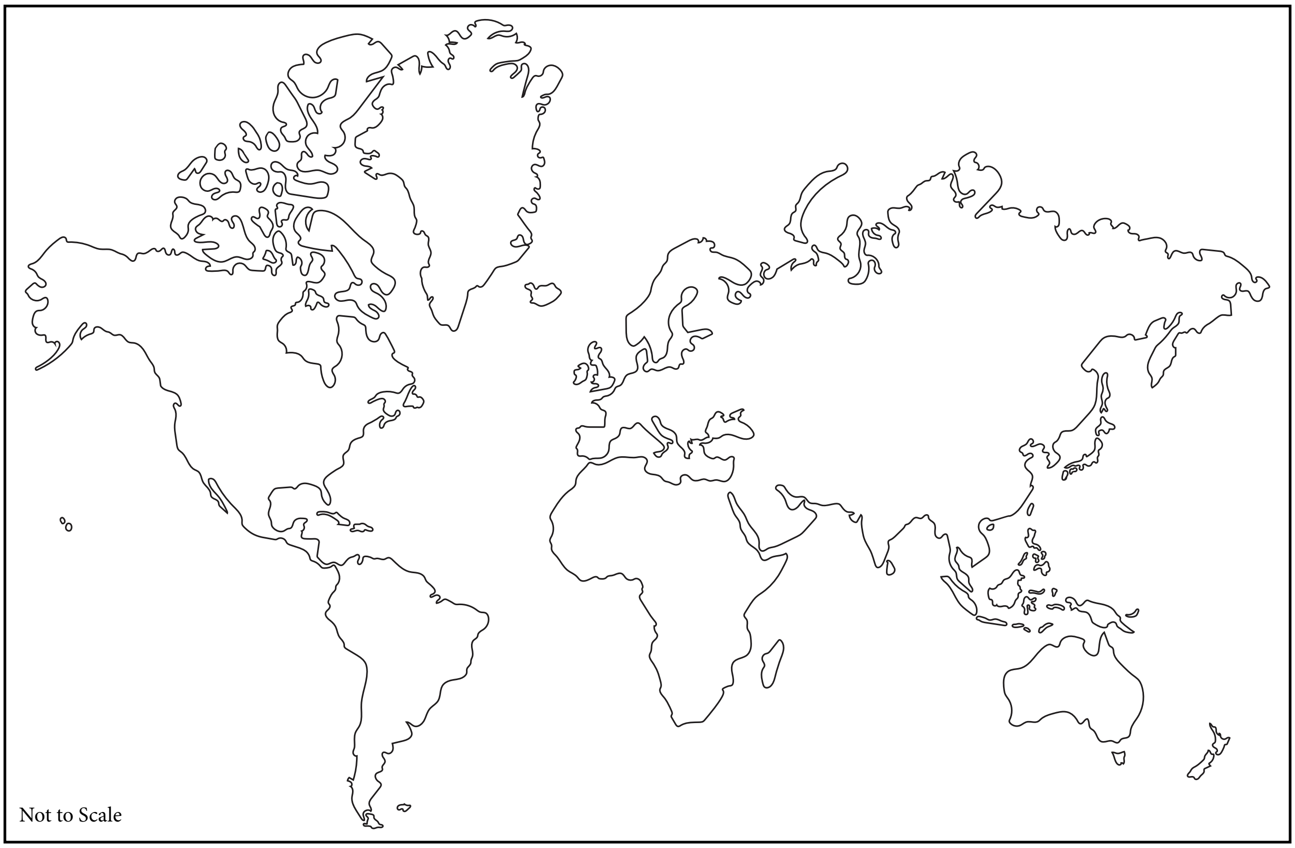
   f. Find out the Isthmuses

   (Create more questions)

3. On the given outline map of the world, label the continents and mountain ranges.
4. On the given outline map of the world, label oceans, seas, isthmus and straits.

Map Activity





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Internet Resources

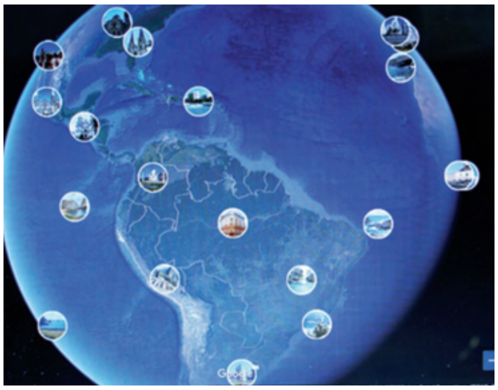
1. www.nationalgeographic.com
2. www.nationalgeographic.org/encyclopedia/landform
3. http://mocomi.com/landforms
4. www.britannica.com

ICT CORNER

Travel around the world!

Travel to the planets and stars and enjoy the adventure!

Lets explore the land forms on Google Earth app.



Step 1:

Use the given link to land on Google Earth.

Step 2:

Use search button on the left top corner to locate the places on the globe. For example: Delhi, Chennai, Keezhadi etc

Step 3:

Press '+' and '-' buttons on screen or use mouse's scroll button to zoom in and zoom out the landscapes and oceans.

Step 4:

Scan and locate the Plateaus to understand the landscape structure. Scan and locate the plains and valley.

Image 1

Image 2

Image 3

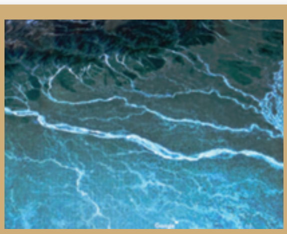


Image 4

URL to launch Google Earth:

https://earth.google.com/web/

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CIVICS

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Unit 1

Understanding Diversity

Learning Objectives

- Know the meaning of diversity
- Understand the existence of diversity in India
- Develop a healthy attitude towards others around you
- Understand the differences in the belief systems of people
- Know to accept and respect the unity in diversity

J5KF4

1. Understanding diversity

Take a look around your class. Do you see any of your classmates who looks similar? Look at the table.

From the below table, we understand that the three students are different from one another. This shows that people speak different languages, eat different kinds of food, celebrate their own festivals and practice a culture different from one another. Similarly, people who live in different parts of our country differ in their ways of life. These differences make us unique as Indians. We come from different backgrounds, belong to different cultures, worship in different

	Student 1	Student 2	Student 3
Mother tongue	Tamil	Malayalam	Hindi
Food	Rice	Puttu	Chappathi
Festival	Pongal	Onam	Holi

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ways, yet we live together. This is known as diversity.

2. Diversity in India

India is a home to a civilisation that is 5,000 years old. Different groups of people from different parts of the world were attracted towards India over the years because of its wealth. Some came for trade with the local people and others were keen on invading its territory. So diverse races of people migrated into India by land and sea routes over time. Thus the Dravidians, Negroids, Aryans, Alpines and Mongoloids became part of the modern Indian race. Then, the people who migrated to India also moved to other parts of the country. This movement and migration of people is the reason for India's rich diversity.

We will now study the diversity in India under the following broad headings: land forms and lifestyles diversity, social diversity, religious diversity, linguistic diversity and cultural diversity.

2.1 Land Forms and Lifestyle Diversity

A continent is a very large area of land with various physical features such as mountains, plateaus, plains, rivers and seas and various types of weather patterns. India has all of them. India is known as a sub-continent. These features have an underlying influence upon the people who live in different landforms of the country.

Physical and climatic features determine the economic activities of a region. People living in the plains thrive on agriculture, while people in the coastal areas take to fishing for their livelihood. In mountainous regions, rearing of animals is undertaken. Hilly landscapes are supported

UNITY IN DIVERSITY

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Landforms

The surface of Earth is covered with different types of landforms.

VALLEY

MOUNTAINS

PLAIN

ISLAND

DESERT

COASTLINE

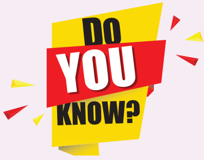
by favourable climatic conditions for the cultivation of coffee and tea.

Diversity in landforms also impacts the flora and fauna of a region. The plant and animal wealth of a place depends upon the natural habitat and the climate that prevails in that region. Food, clothing, occupation and livelihood of the people is closely connected with the region's natural surroundings and climate.

2.2 Social Diversity

2.2.1 Interdependence and Co-existence

A community is a place where people live together with a common interest or heritage. Our community is made up of peasants, labourers, artisans, parents, teachers, students and many others. For a comfortable livelihood, communities depend on each other.



- **Mawsynram** located in Megalaya, is the land of highest rainfall.
- **Jaisalmer** located in Rajasthan, is the land of lowest rainfall.

Mawsynram

Jaisalmer

2.2.2 Family and Society

Families constitute the fundamental unit of a society. There are two types of families: joint families and nuclear families. Families live in a harmonious neighbourhood. Many of neighbourhoods collectively form a village and many of them group together in a city. The needs of people and the interdependence of communities for amenities such as water, food, electricity, education, housing and so on bring us together to live in harmony. Though we are diverse in our cultural practices, we are united and interdependent socially.

2.3 Religious Diversity

India is a secular country. It does not declare any religion as state religion. The freedom of religion is our fundamental right. India is the birth place of many religions and has become the home of many others. Hinduism, Islam, Christianity, Sikhism, Buddhism, Jainism and Zoroastrianism flourish in India.

India is a land of festivals, where people from different religions engage in many colourful celebrations in different parts of the country and co-exist harmoniously. The wide variety of festivals celebrated in India is a true manifestation of its rich culture and traditions. Festivals like Pongal, Deepavali, Holi, Vijayadhasami, AyudhaPuja, Navaratri, Durga Puja, Dussehra, Ganesh Chaturthi, Bihu, Kumbamela, Onam, Miladi Nabi, Ramzan, Christmas, Buddha Poornima, Mahavir Jayanthi, Guru Nanak Jayanthi and Rakshabandhan are some of the festivals that denote the cultural diversity of India.

Toda tribal people.

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Pongal

Deepavali

Christmas

Onam

Miladi Nabi

Buddha Poornima

2.4 Linguistic Diversity

According to census of India 2001, India has 122 major languages and 1599 other languages. Four major Indian language families are Indo-Aryan, Dravidian, Austroasiatic and Sino Tibetian. Tamil is the oldest Dravidian language.

Top Five languages spoken in India (as per 2011 Census)

Language	Percentage of total population
Hindi	43.63 %
Bengali	8.30 %
Telugu	6.93 %
Marathi	7.09 %
Tamil	5.89 %

Historically, the Portuguese, the Dutch, the British, the Danish and the French came to India for trade and their occupation of India or some parts of it has left behind a certain impact upon the culture and language of the people. Because the British ruled over the entire country for over three hundred years before independence in 1947, the English language gained prominence in India. In due course, English has emerged as an important language and a medium of instruction in schools and colleges. It is widely used in official communication and daily life.

The Constitution of India recognises twenty-two languages as official languages. The Government of India has declared Tamil as the first classical language in 2004. Apart from Tamil, five other Indian languages have been declared as the classical languages, by the Goverment of India. Sankrit, Telugu, Kannada, Malayalam, Oriya were announced as classical language in 2005, 2008, 2008 2013, 2016 respectively.

2.5 Cultural Diversity

The term 'culture' refers to customs and practices of people, their language, their dress code, cuisine, religion, social habits, music, art and architecture.

Brihadisvara Temple

St.Thomas
Cathedral Basilica, Chennai

Tajmahal

Sanchi
Stupa

Kandariya Mahadeo
Temple

Konark Sun Temple

The Dilwara
JainTemple

The culture of a group of people is reflected in their social behaviour and interactions. The group identity fostered by social patterns is unique to a group.

Art and architecture are an integral part of every community. It develops as a part of culture and tradition of a community. Each of the 28 states and 9 Union territories of India has rich traditions and unique ways of artistic expression.

DO YOU KNOW?

About 60 percent of the total epigraphical inscriptions found by the Archaeological Survey of India (ASI) are from Tamil Nadu, and most of these are in the Tamil script.

2.5.1 Popular Dances and Music of India

In ancient times, dance was considered as a way to celebrate, worship and also as a gesture of thanks giving and joy. Dances of India reflect its cultural richness.

Music and dance go hand in hand. There are several styles of music practiced in India. The Hindustani music, Karnatic music, Classical Tamil Music, Folk Music, Lavani, Ghazl are some of them. There are songs from various languages composed by blending these different forms of music.

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Folk dances of India	
State	**Popular dance**
Tamil Nadu	Karagattam, Oyillattam, Kummi, Therukoothu, Bommalattam, Puliattam, Kolattam, Thappattam
Kerala	Theyyam and Mohiniattam
Punjab	Bhangra
Gujarat	Garba and Dandia
Rajasthan	Kalbelia and Ghoomer
Uttar Pradesh	Ras Lila
Uttarakhand	Chholiya
Assam	Bihu

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Activity:

You have read about the diversity that exists in our country. Compare and contrast two states.

	Tamil Nadu	Uttar Pradesh
Dance		
Crops		
Food		
Language		
Architecture		

3. Unity in Diversity

Though diversity is visible in every aspect of life in India, we are united by the spirit of patriotism. Symbols such as the National Flag and National Anthem remind us of our great nation and the need to stay united. Celebration of landmark events such as Independence Day, Republic Day and Gandhi Jayanthi every year bring us together and keep the spirit of one nation alive within us.

DO YOU KNOW?

India is known for 'unity in diversity'. This phrase was coined by Jawaharlal Nehru, the first Prime Minister of independent India, in his book *Discovery of India*.

India has a multi-cultural society. India evolved as a single nation through common beliefs, customs and cultural practices. The freedom struggle and the drafting of our Constitution stands as ample evidence to the spirit of unity of India.

DO YOU KNOW?

V.A. Smith called India as an *'Ethnological museum'*, as a great variety of racial types exist.

Summary

- India is the land of unity in diversity.
- Diversity is a state of being different from each other.
- Landforms and climate have an impact on diversity.
- Physical features and climatic conditions determine the economic activities of a region.
- Diversity in landforms also impacts the flora and fauna of a region.
- Linguistic, religious, social and cultural diversity exists in India.
- India is a sub-continent with all the physical features of a continent.
- According to census of India 2001, India has 122 major languages and 1599 other languages.

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- ❖ Culture refers to social behaviour and practices of a particular society.
- ❖ Classical and folk dances of India exhibit the rich cultural diversity in India.

A-Z GLOSSARY

1.	Diversity	-	a range of different people or things.
2.	Inter-dependence	-	the dependence of two or more people or things on
3.	Co–existence	-	living in harmony and peace
4.	Linguistics	-	Scientific study of language, analysis of language form, language meaning and language in context.

EXERCISES

I. Choose the correct answer

1. India consists of____ States and _____ Union territories.

   a. 27, 9 b. 29, 7
   c. 28, 7 d. 28, 8

2. India is known as a

   a. Continent b. Sub continent
   c. Island d. None of these

3. Mawsynram, the land of highest rainfall is located in

   a. Manipur b. Sikkim
   c.Nagaland d. Meghalaya

4. Which one of the following religion is not practised in India

   a. Sikhism b. Islam
   c. Zoarastrianism d. Confucianism

5. Recognised official languages of India, as per VIIIth Schedule of Indian Constitution

   a. 25 b. 23 c. 22 d. 26

6. Onam festival celebrated in

   a. Kerala b. Tamil Nadu
   c. Punjab d. Karnataka

7. Mohiniyattam is a classical dance of

   a. Kerala b. Tamil Nadu
   c. Manipur d. Karnataka

8. 'Discovery of India' – a book was written by

   a. Rajaji b. V.O.C
   c. Nethaji d. Jawaharlal Nehru

9. The phrase ' Unity in Diversity' was coined by

   a. Jawaharlal Nehru
   b. Ambedkar
   c. Mahathma Gandhi
   d. Rajaji

10. V.A. Smith called India as __________

    a. Great Democracy
    b. Unique land of diversities
    c. Ethnological museum
    d. Secular nation

II. Fill in the blanks

1. Geographical features and climatic conditions determine the __________ activities of a region.
2. Jaisalmer, the land of lowest rainfall is located in _________.
3. Tamil was declared as classical language in the year _______.
4. Bihu festival is celebrated in__________.

III. Match the following

1. Negroids	-	Religion
2. Coastal areas	-	India
3. Zoroastrianism	-	Fishery
4. Unity in diversity	-	Indian race

IV. Answer the following questions

1. Define diversity.
2. What are the types of diversity?
3. Why is India called a sub continent?
4. Write the names of three major festivals celebrated in India.
5. List out some of the classical dances of India.

6.Why is India called the land of unity in diversity?

V. Answer the following in detail

1. Explain : Linguistic diversity and cultural diversity.
2. "India is a land of diversity, yet we are all united". Explain.

VI. Projects and Activities

1. "The occupation of people depends on the landform of a place". Give some examples.
2. Read about a state of your choice and make an album to show the culture and tradition of people who live in that state.
3. Collect the pictures to show the art and architecture of Tamil Nadu.

VII. HOTS

1. List out the various festivals celebrated in different states.

VIII. Life Skill

1. Suggest measures to bring unity in your school.

Internet Resources

1. Wikipedia.org/wiki/unity_in_diversity
2. http://www.yourarticlelibrary.com
3. www.readmeindia.com
4. http://www.indiaculture.nic.in

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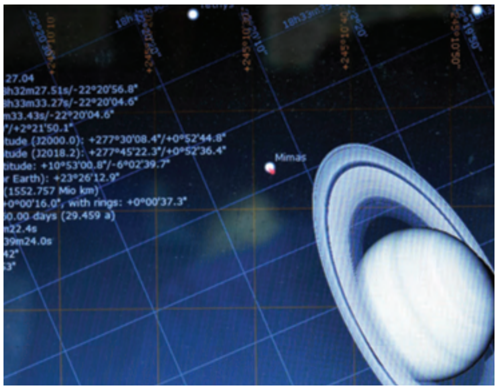
ICT CORNER

UNDERSTANDING DIVERSITY

Lets do this activity to explore the India's culture, art, tradition and land forms.



Step 1:

Type the URL link given below in the browser OR scan the QR code. You can also download the "Google Arts & Culture" mobile app from the given app URL.

Step 2:

Click the search button from the right top corner and type any Indian state name to explore their tradition and heritage.

Step 3:

Scroll down the page and view the famous architectures in 360° view using "Explore in 360°" option.

Step 4:

Search for any important landforms of India and explore them.

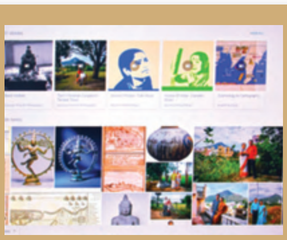


Image 1

Image 2

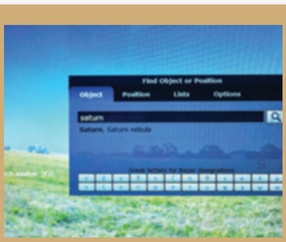


Image 3

Image 4

URL for Google Arts & Culture:

https://www.google.com/culturalinstitute/beta/

URL for Google Arts & Culture mobile app:

https://play.google.com/store/apps/details?id=com.google.android.apps.cultural&hl=en

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Unit 2

Achieving Equality

Learning Objectives

- Know the meanings of prejudice and stereotypes
- Understand discrimination and inequality
- Become aware of the negative consequences of discrimination

The society that we live in comprises people from various social groups who are different in many ways. Since we believe in 'Unity in Diversity', we should have been living peacefully with one another irrespective of those differences. Often, we see that diversity is not accepted, and people show attitudes of hostility towards those who are 'different' from them. They form opinions about the other groups and this often leads to tension in the society. Such 'opinions' are often 'prejudiced'.

1. Prejudice

Prejudice means to judge other people in a negative or inferior manner, without knowing much about them. It happens when people have false belief and ideas.

Prejudice ⟶ Pre + Judge

The word 'prejudice' refers to prejudgement. Prejudices can be based on many things like people's religious beliefs, the region they come from, the colour of their skin, language, their accent or the clothes they wear. The types of prejudice are gender prejudice, racial prejudice, class prejudice, disability prejudice and so on.

For example, urban people are more civilised than rural people in attitudes and behaviour, is one such prejudice.

1.1 Causes for Prejudice

Some common social factors that contributes to the rise of prejudice are

1. Socialisation
2. Conforming behaviours
3. Economic benefits

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4. Authoritarian personality
5. Ethno–centrism
6. Group closure
7. Conflicts

2. Stereotypes

When prejudice gets stronger, it develops into a stereotype. Stereotype is a false view or idea about something. For example, girls are not good at sports. Stereotype is learned at a very early age, and children grow to have very strong ideas or opinions about things, groups or ideologies. As children grow up, the lines of like and hate for other things, people, cultures, beliefs, languages become sharper.

Example

Ragu was hit in his eye with a soft ball and to everyone's surprise, he started to cry. The others started to laugh at him; Mani felt sad for him but started laughing along with others.

In the above example, we have a general opinion that girls cry and boys don't cry. When Ragu cried out of pain, others laughed at him. Now we understand that when we fix people in our image, we create a stereotype.

Gender-based stereotypes are often portrayed in films, advertisements and TV serials. Almost all the advertisements related to detergents, washing machines, dishwashers and others show a woman as the main lead or user of that product. On the other hand, all the stunts shown in a bike advertisement is performed by ferocious looking men.

3. Inequality and Discrimination

Inequality means difference in treatment. The different forms of inequalities such as caste inequality, religious inequality, race inequality or gender inequality give rise to discrimination.

Discrimination can be defined as negative actions towards people. Inequality and untouchability are caused by discriminations based on caste, religion and gender. Treating dark-skinned people differently from fair-skinned people, and denying equal status, rights and opportunities on the basis of colour, caste, gender, religion etc. are the formidable discriminatory trends afflicting India.

Article 15(1) of the Constitution states that the State shall not discriminate against any citizen on grounds of religion, race, caste, sex, place of birth.

DO YOU KNOW?

End of Apartheid

After 27 years in prison, former South African President, Nelson Mandela, was freed in 1990 and succesfully achieved the end of apartheid in South Africa, bringing peace to a racially divided country and leading the fight for human rights around the world.

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DO YOU KNOW?

Dr. B.R. Ambedkar

- He is popularly known as Baba Saheb.
- He was an Indian jurist, economist, politician and social reformer.
- He earned his M.A. in 1915 and then obtained a D.Sc at the London School of Economics before being awarded Ph.D by Columbia University in 1927.
- He served as the chairman of drafting committee of the constituent assembly and hence regarded as the father of Indian Constitution.
- He was independent India's first Law Minister.
- He was posthumously awarded the Bharat Ratna in 1990.

3.1 Caste Discrimination

Caste system is the most dominant reason for inequality and discrimination in India. The caste system originated in the Varna system of the Vedic Aryan society. In the beginning Varna was an occupation based flexible social division. In the Later Vedic Society, the Varna system was expanded into a rigid, discriminatory, birth based graded caste divisions.

Many people in India have fought against caste oppression. The most prominent among them was Dr. B.R. Ambedkar. He belonged to a such depressed family and suffered discrimination throughout his childhood. He fought actively for the annihilation of caste so as to ensure equality among all the citizens of India.

3.2 Gender Discrimination

Gender discrimination refers to health, education, economic and political inequalities between men and women. For example, A girl is not allowed to go to college after finishing her schooling. Similarly, most of the girls are not allowed to select a career of their choice rather they are forced into marriage. In some families, girls are not allowed to wear modern dresses while boys in such families often wear modern dresses.

3.3 Religious Discrimination

Religious discrimination is unequal treatment of an individual or group based on their beliefs. Religious discrimination has been around for a long time. There have been problems between people of different religions for thousands of years. Our Constitution has provided equality for all irrespective of their caste, religion, language, place of birth etc. Yet discriminations are still in practice even in worship places on the basis of caste, religion, gender and language. Our great social thinkers have been crusading against such discriminations and inequalities.

Literacy rate – 2011 Census

High			Low		
S.No.	**District Name**	**Percentage**	**S.No.**	**District Name**	**Percentage**
1	Kanyakumari	92.14%	1	Dharmapuri	64.71%
2	Chennai	90.33%	2	Ariyalur	71.99%
3	Thoothukkudi	86.52%	3	Villupuram	72.08%
4	The Nilgiris	85.65%	4	Krishnagiri	72.41%

Source: Censusindia.gov.in>tamilnadu

Sex Ratio – 2011 Census

Number of females per 1,000 males

High			Low		
S.No.	**District Name**	**Sex Ratio**	**S.No.**	**District Name**	**Sex Ratio**
1	The Nilgiris	1041	1	Dharmapuri	946
2	Thanjavur	1031	2	Salem	954
3	Nagapattinam	1025	3	Krishnagiri	956
4	Thoothukkudi, Tirunelveli	1024	4	Ramanathapuram	977

Source: Censusindia.gov.in>tamilnadu

3.4 Socio-Economic Inequality

In the socio-economic field, the benefits of growth have not been spread evenly. The low-income districts are associated with low industrial development, low agricultural productivity and low human development. Similarly, the Districts with low literacy rate are found to be with lower sex ratio.

3.5 Remedial Measures for Abolishing Inequality and Discrimination

The remedial measures for abolishing inequality and discrimination in Indian society are as follows.

1. Wider access to quality basic services like healthcare and education for all.
2. Be aware of current gender bias.
3. Make women more visible in public life and institution to eradicate gender disparity.
4. Be open to learning about other religions.
5. Promoting community dining in the classroom may help the students to sit together without any bias of caste, religion or gender.
6. Socialise with people of all types outside home.
7. Effective implementation of laws.

ACHIEVERS

Dr. APJ ABDUL KALAM

(1931-2015)

Avul Pakir Jainulabdeen Abdul Kalam was born in a Muslim family in Rameswaram. He was the 11th President of India and who is fondly remembered as People's President.

He completed his schooling at Ramnad, graduation from St. Joseph's College, Trichy, and went on to study aerospace engineering at the Madras Institute of Technology (MIT) after he joined the Defence Research Development Organisation (DRDO).

Kalam's family had become poor at his early age; he sold newspapers to supplement his family income.

He was a recipient of several prestigious awards, including the **Bharat Ratna**, India's highest civilian honour in 1997.

Kalam has written many books. Among them, very famous books are *India 2020, Wings of Fire, Ignited Minds, The Luminous Sparks* and *Mission India*..

His outstanding work earned him the title of the **'Missile Man of India'.**

Mr.VISWANATHAN ANAND

Viswanathan Anand was born in Chennai in a middle class family. His mother was a big fan of chess and taught him to play the game when he was just five years old. She encouraged and motivated him a lot and this laid the foundation for his future career as a chess player.

Anand has won the world chess championships five times (2000, 2007, 2008, 2010 and 2012).

He won the World Junior Chess Championship at the age of 14.

He became India's first grandmaster in 1988.

He was the first recipient of the **Rajiv Gandhi Khel Ratna Award** in 1991-92, India's highest sporting honour.

He received the nation's second highest civilian award Padma Vibushan in 2007.

Ms. S. ILAVAZHAGI

S. Ilavazhagi came from a poor family at Vyasarpadi, Chennai. His father is a daily wage-earning auto-rickshaw driver.

She participated in the 2008 **World Carrom Championship** at Palais Des Festivals, Cannes, France, and bagged her maiden women's title.

She participated and won the Indian National Carrom Championship in the same year after beating the former World Champion Reshmi Kumari.

Mr. MARIYAPPAN THANGAVELU

Mariyappan was born at Salem in Tamil Nadu. His mother raised her children as a single mother, carrying bricks as a labourer until becoming a vegetable seller, earning about Rs.100 per day.

He suffered permanent disability in his right leg. When he was young despite this setback, he completed secondary schooling. He says, "I didn't see myself as different from able-bodied kids."

In 2016, At the Rio Paralympics, he won the **gold medal in the men's high jump** T-42 event, with a leap of 1.89 m.

From the above examples, you will clearly understand that people from diverse backgrounds facing adverse conditions were still able to achieve greater success in their lives.

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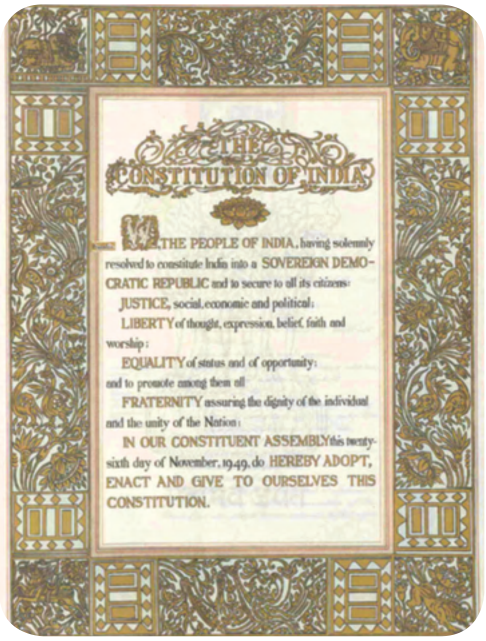

THE CONSTITUTION OF INDIA

WE, THE PEOPLE OF INDIA, having solemnly resolved to constitute India into a SOVEREIGN DEMOCRATIC REPUBLIC and to secure to all its citizens:

JUSTICE, social, economic and political;

LIBERTY of thought, expression, belief, faith and worship;

EQUALITY of status and of opportunity; and to promote among them all

FRATERNITY assuring the dignity of the individual and the unity of the Nation;

IN OUR CONSTITUENT ASSEMBLY this twenty-sixth day of November, 1949, do HEREBY ADOPT, ENACT AND GIVE TO OURSELVES THIS CONSTITUTION.

3.6 Constitution of India and Equality

A Constitution is a set of rules and regulations guiding the administration of a country. Article 14 of the constitution of India provides equality before the law or equal protection within the territory of India and prohibits the unreasonable discrimination between persons.

Our Constitution says ours is a land of diversity; therefore, equality has to be ensured for all. Two significant parameters to ensure equality in society are respecting diversity and ensuring freedom. The different kinds of freedom are freedom to follow their religion, speak their language, celebrate their festivals and express their views freely.

The Constitution is a legal framework of rules and regulations by which a nation would function. Equality is where untouchability is seen as a crime. In India, as per the Article 17 of the Indian Constitution, untouchability is totally abolished and it's any form is forbidden.

Even today, different types of discrimination are reported across the country. Women, peasants, tribes and people from lower social classes are still striving for equality in India.

Summary

- Prejudice means to judge other people in a negative or inferior manner, without knowing much about them.
- Stereotype is a false view or idea about something.
- Discrimination can be defined as negative actions towards people. Discrimination can happen on the basis of colour, class, religion and gender.
- Caste system is the most dominant reason for inequality and discrimination.
- Gender discrimination refers to health, education, economic and political inequalities between men and women.
- Religious discrimination is unequal treatment of an individual or group based on their beliefs.

A-Z GLOSSARY

1.	Prejudice	-	Negatively judging other people or seeing other people as inferior
2.	Stereotype	-	Creating a standard image
3.	Discrimination	-	When people are not treated equally on the basis of caste, colour, religion, sex etc.,
4.	Inequality	-	Lacking equality, either economic or social or both
5.	Constitution	-	A constitution is a set of fundamental principles or established precedents according to which a state or other organisation is governed.

EXERCISES

I. Choose the correct answer

1. Which one of the following is not the reason for Prejudice?
   a. Socialization
   b. Economic Benefits
   c. Authoritarian personality
   d. Geography
2. Discrimination done on the basis of gender is referred to as
   a. gender discrimination
   b. caste discrimination
   c. religious discrimination
   d. inequality
3. Gender-based stereotypes are often portrayed in
   a. films b. advertisements
   c. TV serials d. All of these
4. Name the book/s written by A.P.J. Abdul Kalam
   a. India 2020
   b. Wings of Fire
   c. Ignited Minds
   d. All of these
5. A.P.J. Abdul Kalam was conferred Bharat Ratna in the year
   a. 1997 b. 1996
   c. 1995 d. 1994
6. Viswanathan Anand became India's first grandmaster in the year.
   a. 1985 b. 1986 c. 1987 d. 1988
7. In which sport Ilavazhagi excels
   a. Chess b. Wrestling
   c. Carrom d. Tennis
8. Which article of the Constitution says discrimination against any citizen on grounds only of religion, race, caste, sex, place of birth or any of them is not permitted?
   a. 14(1) b. 15(1) c. 16(1) d. 17(1)
9. B.R. Ambedkar was conferred Bharat Ratna in the year
   a. 1990 b. 1989 c. 1988 d.1987
10. As per the 2011 Census the highest literate district in Tamil Nadu
   a. Namakkal b. Salem
   c. Kanyakumari d. Sivagangai

II. Fill in the blanks

1. People have false belief and ideas on others is called ____________.
2. A.P.J. Abdul Kalam was born in_______.
3. ______ was the first recipient of Rajiv Gandhi Khel Ratna award, India's highest Sport honour.
4. __________ was the independent India's first Law Minister.
5. As per the 2011 Census the lowest Sex ratio was in _____________.

III. Match the following

1.	Prejudice	-	abolition of untouchability
2.	Stereotype	-	treating someone less fairly than others
3.	Discrimination	-	equality before law
4.	Article 14	-	false view or idea about something
5.	Article 17	-	judge other people negatively

IV. Answer the following questions

1. What is Prejudice?
2. What is stereotype?
3. What is discrimination?
4. What are the articles that are discussing the equality in the Indian Constitution?

V. Answer the following in detail

1. What are the causes of Prejudice?
2. Write any two types of discrimination?
3. Explain the solution to the removal of inequality and discrimination in Indian society?

VI. Projects and Activities

1. Split the class into small groups, discuss with your peer group on discrimination and write a report on it.
2. Collect information about any two famous personalities who faced prejudice and discrimination.

VII. HOTS

1. Various discrimination in India. Discuss.

VIII. Life Skill

1. How can you fight against prejudice and discrimination in your village?

Internet Resources

1. http://www.ncsc.nic.in/
   (The National Commission for Scheduled Castes)
2. http://ncst.nic.in/
   (The National Commission for Scheduled Tribes)
3. http://www.ncw.nic.in/
   (The National Commission for Women)
4. Censusindia.gov.in

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